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COTTON TEXTILE INDUSTRY
SURVEY FOR WEST TEXAS

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Foreword

The purpose of this report is to set forth the advantages of West Texas for cotton textile manufacturing, and to compare these with advantages of the present location of the industry. The report is intended to serve as a comprehensive guide for acquiring a segment of the cotton textile industry. It is not intended as a definite instruction for locating a specific mill in a given locality. Individual products will require detailed market surveys, and individual towns will require local area surveys.

Texas Technological College
Research Committee

Preface

This report reviews conditions in the cotton textile industry and compares the advantages offered by West Texas with those of existing cotton mill locations.

It is a result chiefly of the search of numerous books, trade papers, State and Federal Government publications, association bulletins, and trade literature. Also, the report is supported by information gained through correspondence and conversations with mill executives, State and Federal Government officials, research workers, association heads, labor leaders, chamber of commerce men, and individual business men.

With large gains in population west of the Mississippi River, it seems that cotton textile manufacturing migration westward is a natural course of events. West Texas has several advantages for acquiring an industry, and these will be strengthened as mills move into the area. However, immediate, continuous efforts will be necessary in order to attract industry. The first essential to getting an industry of any size is the location of a finishing plant somewhere in or near West Texas.

This report is to be used only as a guide for locating cotton mills in this section. Any efforts to determine the most appropriate size and type of mill for a specific locality, or the best location for a given mill, will require detailed local surveys.

Special appreciation is due Dr. A. B. Cox, Professor of Cotton Marketing and Cotton Marketing Research, University of Texas, for his help in getting source material and his advice in setting up the report; Dr. Robert W. French, Director of the Bureau of Business Research, Universtity of Texas, for his helpfulness and encouragement; Mr. W. B. Langford, Engineering Experiment Station, Texas A & M College, for his work in setting up freight rates; and all of those in Government work and private business who have given so generously of their time and advice.

M. E. W.

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The object of this report is to present the facts which relate to the prospects for establishing a cotton manufacturing industry in West Texas.

Development of a region begins with livestock raising and agriculture. Usually these will more than support the population in the early stages of development. As population increases, agricultural production increases. However, there is a limit to the population which a purely agricultural economy will support to the best advantage.

Cotton is an important resource to any section where it can be grown. This is especially true in West Texas which produced 1,760,670 bales in 1947, 15 percent of the national production.

Cotton Manufacturing in West Texas and in Other Sections

Cotton manufacturing was the first mechanized industry. Its mechanization ushered in the industrial revolution about the middle of the eighteenth century. Most of the fundamental inventions were made in England, and that country tried to monopolize the textile industry by prohibiting export of machinery or plans. An Englishman, Samuel Slater, left England secretly, because of stringent regulations of the English Government to prevent a knowledge of textile machines spreading abroad, and established a mill in Rhode Island in 1790. Thus the "know-how", the first requisite for a textile industry, was located in New England. Other economic factors which favored that section were a comparatively dense population, unprofitable agriculture, and adequate water power.

The South remained almost exclusively agricultural until the middle of the nineteenth century, because of the profitability of large-scale farming. About 1850, with an increasing population and other factors favorable to manufacturing, the South began to acquire some volume of textile manufacturing. The movement was slowed temporarily by the Civil war; but today the greater part of the cotton manufacturing industry is located in the Southeastern states. Meanwhile, New England's cotton textile industry has declined steadily, and it seems that in time there will be none of it left in that part of the country.

Cotton textile manufacturing did not come to Texas until the latter part of the nineteenth century. From 1895 to 1907, the number of spindles increased from practically nothing to about 110,000. In 1920, there were 145,054 spindles in place; and by 1929 this figure had increased to 282,240. Today there are 239,000 cotton spindles in Texas. This represents a decline of 15 percent. The decline for the United States as a whole

during the last 19 years has been approximately 32 percent, or more than twice that for Texas.

West Texas acquired its first cotton mill after 1900. Today this section has about 58,000 spindles, which is nearly 25 per cent of all of the cotton spindles in Texas.

Expanding Western Markets

West Texas is strategically located in that it is not far south of the center of the United States. It is nearer to the Farm West, Southwest, and Far West markets than is the Southeastern section. Also, its location should enable it to take advantage of the growing South American markets.

Estimated population of the United States is approximately 18 percent higher than the census of 1940. The population gain for some of the Far Western states is as much as approximately 40 percent. The more densely populated industrial East did not grow at anything like the same rate. With this great trend of population Westward, there also has been a steady movement from the farm to the factory so that this country, once predominantly agricultural, now is predominantly industrial.

This "go west" pattern of the Nation's population is pictured graphically by the map on the next page. This shows the population trend for each state between the last census, 1940, and the Census Bureau's estimates as of July 1, 1947.

The Farm West, Southwest, and Far West have a much expanded and much larger over-all market in terms of population and income, 32 percent and 31 percent respectively. Though they still have less than 3 percent of textile employment, after a wartime gain of 0.5 percent, the trends here are for accelerated textile growth.

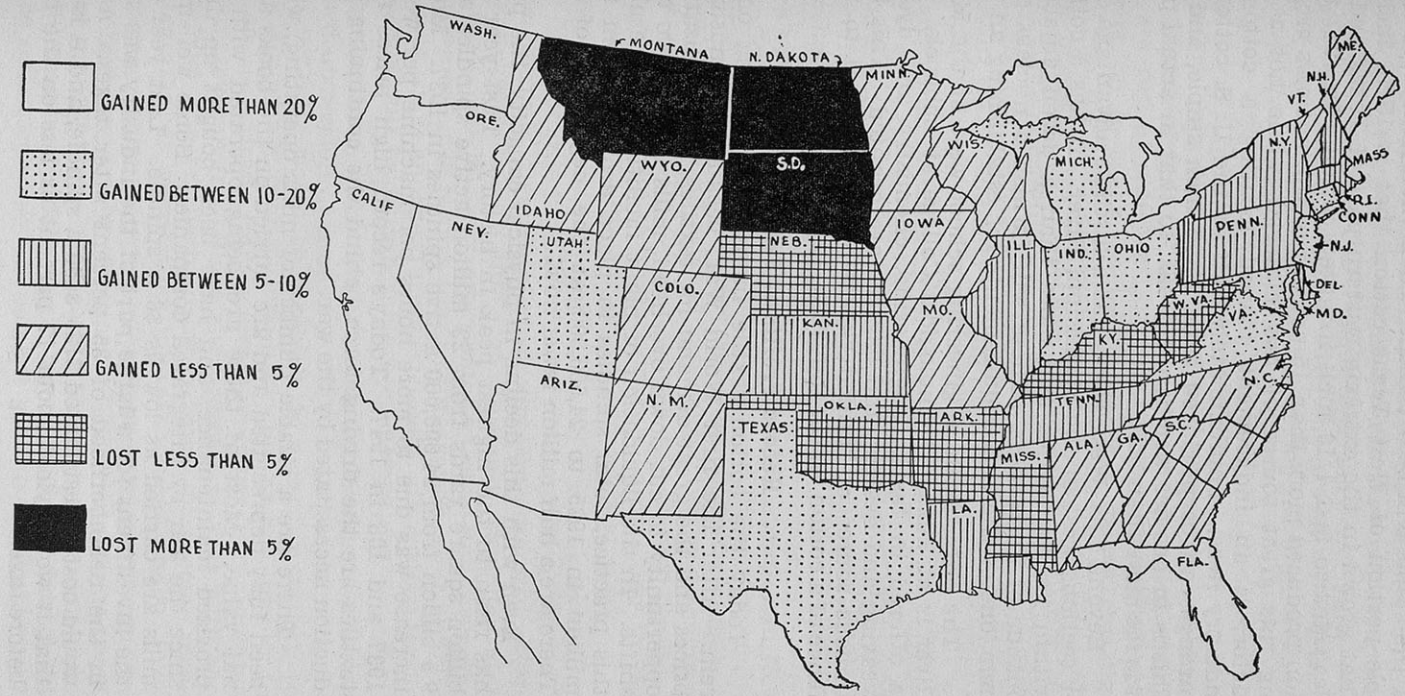
Other sections are aware of the growing Western markets and the potentialities for cotton textile manufacturing. It is reported that the Arizona Corporation Commission has granted a new textile company permission to sell 150,000 shares of capital stock at par value of $10.00 per share. With headquarters in Phoenix, the firm is to engage in the textile manufacturing business and plans to make bed sheets, pillow cases, window curtains, upholstery fabrics, and canvas. Anticipated employment is of more than 1,000 people.

West Texas is in an especially favorable spot to acquire a large part of this textile growth. It has no industry to employ a large number of its women. Many women who worked during the war would prefer to continue working if suitable employment could be found. And there are many others who did not do war work, but who no doubt have the same desire.

West Texas Has Advantages

This region contains one of the most highly productive cotton growing areas of the world. Most of the cotton grown here has been 13/16 inch staple. However, since the War, irrigation is being used extensively in the High Plains, so that most

MAP OF POPULATION TRENDS IN THE UNITED STATES 1940 - 1948



of the staple will be 7/8 inch. Then there is a not inconsiderable portion of West Texas cotton that is 15/16 inch staple. That grown in the extreme western part of Texas and eastern New Mexico is 1 1/16 inch irrigated cotton. In 1947 this section produced more than 15 percent of the nation's crop. Having this great source of raw material, while not a deciding factor, is an inducement toward locating a cotton textile industry here. Approximately half of the U. S. cotton textile yardage can be produced from 15/16 inch staple, and shorter. This is in heavier weights of goods, so that in actual poundage it is far more than half.

Beyond this, West Texas has a distinct advantage over other sections west of the Mississippi River. It has 5 cotton mills within its boundaries and more than a dozen adjacent, just outside of its borders. These will furnish a nucleus of skilled help, one of the first requirements for establishing an industry.

The only textile engineering school west of the Mississippi River is at Texas Technological College at Lubbock. Training is offered in textile engineering, chemistry and dyeing, and weaving and design; and degrees are granted. This is a continuous source of trained "know-how"—essential to the existence of a cotton textile industry.

Record Profits at Peak Capacity

Today the cotton textile industry is running on a tight rein. After the first World War, because of unusually high prices and the great demand for textiles, plus realization of an opportunity to cut down overhead, mills ran on two and three shifts. In the liquidation of plant facilities that resulted from this practice, total spindles in place dropped from nearly 38 million in 1925 to 24,500,000 at the beginning of the war. There are a half million fewer now.

Even with this decline in physical capacity, the production has risen to the highest peak in history. Last year it was 11 billion square yards from 22 million active spindles as against 9.5 billion from 24,000,000 active spindles in 1937. Most of this increase was due to more hours per machine per week—77 in 1937 and 108 in 1947. Today's record high prices for cotton textiles are the driving force behind the continuing high production necessitated by the war.

There are a sizable number of mills operating, which have been fully depreciated and are carried on the books at a nominal value. Most of these are being operated with only improvised maintenance, and have been bought up during and since the war by integrated companies. Some well-maintained mills are carried as low as $6 a spindle. Last year return on the investment for a large part of the industry was somewhere in the neighborhood of 35 percent after taxes. A new mill would cost an estimated $125-$150 a spindle, and it is estimated that it would yield about 17 percent or less on the investment before taxes.

New textile machinery cannot be bought on short term delivery. With new machinery deliveries promised from two to three years in advance, there is little prospect of many new mills being built in the near future. The prevailing existence of low-cost, high-return, old mills makes the chances of building complete new mills even more remote.

Trend Toward Migration

These low-cost, high-return old mills would be high-cost mills except for the manner in which they are operated. Many of them are run at a low maintenance cost, patched up with baling wire, so to speak, to take advantage of current high prices. When the price situation tightens up, those mills will go out of business. In replacing these with new plants, the integrated companies will look for new locations in lower-cost areas. There has been a widespread trend toward migration in the cotton textile industry during and since the war, and it probably will continue.

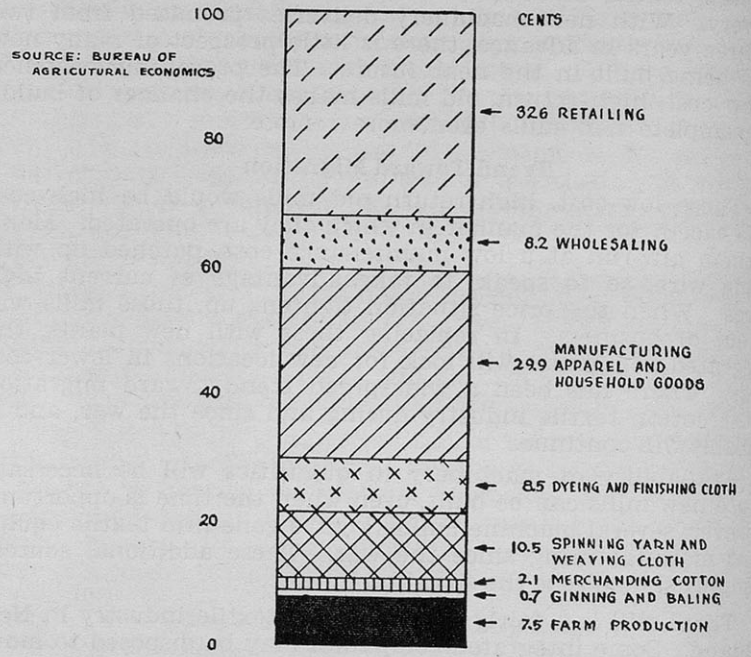
Availability of machinery in quantities will be necessary before new mills can be built, even when the time is opportune. However, several machine builders have gone into textile equipment manufacturing since the war. These additional sources of supply should ease the situation in time.

There still is a fairly sizable cotton textile industry in New England. Some integrated companies may be disposed to move plants out of the East to escape the high operating costs of that region. The head of a great vertically integrated company which operates a quarter-million spindle mill in New England, holds the view that equal production can be obtained in the South at $1,000,000 less annual direct and indirect costs.

During the periods of prosperity and business expansion the trend in the textile industry is toward integration. Vertical integration permits flexibility of production, thereby widely increasing net profits. In times of depression and declining markets, the trend is away from integration. But, over the long term the trend is always toward integration, so it appears that at some time in the future virtually all cotton textile manufacturing will be within integrated companies.

Integration inherently results in certain influences which tend toward dispersion of industry. The management of large companies logically would be disposed, to a certain extent, to scatter their holdings over as broad an area as practicable, to gain a favorable attitude from a greater number of representatives in the Government. Since the prospect is that with the passing of time, the textile industry is bound to become more highly integrated, it seems that migration must follow.

Any section which acquires a part of this migrating cotton textile industry will be fortunate. The bar chart, next page, based on 1939 figures, is a vivid illustration of this fact. Of the total consumer's dollar paid for apparel and household goods made of cotton, only 7.5 percent goes to the farmer, 0.7



APPROXIMATEE DISTRIBUTION OF THE CONSUMER'S DOLLAR PAID FOR APPAREL AND HOUSEHOLD GOODS MADE OF COTTON, BY OPERATIONS OR SERVICES, UNITED STATES, 1939, (BASED ON OFFICIAL AND OTHER DATA AND PARTIALLY ESTIMATED)

percent to the ginner, and 2.1 percent to the cotton merchant. This is a total of 10.3 percent. Add to this the 32.6 percent for retailing, for a total of 42.9 percent—West Texas' share of the consumer's dollar spent for apparel and household goods made of West Texas quality cotton. The volumes of spinning yarn and weaving cloth, dyeing and finishing cloth, manufacturing apparel and household goods, and wholesale in West Texas are so small as to be almost negligible. Hence, 57.1 per cent of the consumer's dollar spent for apparel and household goods made of West Texas or comparable cotton, is lost to the area.

West Texas is in a favorable position to expand its cotton textile industry by being alert to this migration and making efforts to have industry locate here. Figures from the Bureau of Labor Statistics, of the U. S. Department of Labor, show a shift in the U. S. industrial employment of 3 percent from the Northeast to the South and West, 1939,1947. Indications are that more than half of the new industrial plants being built today are in the South and West, and that the migratory process is being speeded up beyond the average rate of the 1939-1947 period.

An indication of this movement is borne out by increases in dollar values of apparel and finished fabrics and textile mill

products manufactured in Texas. The value of apparel and finished fabrics for 1946 was almost three times that of 1940. The value increase for textile mill products for the same period was 240 percent. Much of this increase was due to higher inventory values; however, a large part also was due to increased volume of manufacturing.

There is some evidence that Eastern capital already is interested in West Texas as a potential center of cotton Textile manufacturing. One large integrated company purchased a mill in Texas in the early 1930's. Today that mill has more than doubled in size, has become one of the best in the organization, and is the largest in this state.

During the War another company bought three Textile mills including one in West Texas. More recently this same company acquired another cotton mill in West Texas, and plans are under way for its expansion. Several thousand spindles have been added, and it is reported that several thousand more spindles and a finishing plant are to be added. The quality of its production is being up-graded, so that it is expected to be one of the best as well as one of the largest mills in the state.

Manufacturing Processes

Cotton manufacturing starts with cotton right from the bale. Bales of fiber are bought and blended according to the type of yarn or fabric a mill is making. In addition to the necessity of buying the correct grade and staple, the mill must always buy in the most favorable market. For this reason a manufacturer may buy cotton from different localities and even different states from time to time, depending upon crop conditions and the market situation.

In the first process at the mill, bales of cotton are opened and fed to a battery of blending feeders, from whence they pass through a series of cleaners and pickers. Finally the cotton emerges from the last picking process in the form of laps. These laps are delivered to the carding process, which removes remaining foreign matter and certain very short fibers. The stock is delivered in loose rope-like form known as sliver.

Next the sliver is passed through one, and usually two, processes of drawing. Here several slivers are combined and attenuated. Then the sliver goes to the roving frames where it further is drawn out, and delivered in a form known as roving.

Roving is delivered to a series of spinning frames, which draw and twist it until the desired single-ply yarn has been obtained. After this, the single-ply yarn may be twisted into whatever multiples may be required.

Yarn for weaving is divided into two classes—warp yarn and filling yarn.

Warp yarn, which is the longitudinal element of the fabric, is wound on beams and sized with a starch solution at the slashing process.

Filling yarn, which makes up the transverse element of a fabric, is wound on bobbins and used in loom shuttles.

Most cotton goods are not ready for the market when they come from the looms. They must be bleached, dyed, or otherwise finished before they are ready for consumption.

Some mills have their own finishing plants, and their production is ready for the market at the time of shipment. However, probably the majority of mills are what are known as gray goods mills, that is, they have no finishing plants. The products of these mills are shipped to finishing plants which operate separately from the manufacturing plants.

A finishing plant of this type will serve the needs of a number of gray goods mills, and can be operated most advantageously at some location between the mills and the distribution point for the finished goods. There are no finishing plants west of the Mississippi River, and only two on that river.

West Texas Needs a Finishing Plant

Before West Texas can have a cotton textile industry of any size, it will be necessary to have a finishing plant somewhere in or near this area. This is particularly true for serving Farm West, Southwest and Far West markets. The backhaul from points in West Texas to finishing plants east of the Mississippi River, when selling in these markets would be prohibitive.

In textile finishing, abundant local supplies of pure water are indispensable and are a determining factor with respect to plant location. Probably 60,000 to 80,000 gallons of soft water would be required for bleaching a ton of cloth. A natural water containing not more than 50 parts per million of hardness can be used for textile purposes. Water harder than this will require softening; but with modern softening methods this is not an insurmountable problem.

Possibly a finishing plant located anywhere in Texas or eastern New Mexico would serve the needs of a considerable number of gray goods mills in West Texas. Within West Texas itself, underlying the High Plains is one of the largest underground water reservoirs in the world. In addition there are several rivers, lakes and potential dam-sites.

Any textile finishing enterprise must concern itself with the problem of waste disposal. Most textile wastes are organic in character, and the cost of treating them is not excessive. In many places the porous structure of the ground will permit absorption, so that treatment might not be necessary.

The market picture has changed and continues to change from what it was in years past. Worth Street in New York still is the Nation's largest marketing center for cotton textiles; but at one time virtually the entire production of the industry was channelled through it. This is no longer true. In the Farm West, the Southeast, and the Far West, textile and apparel fields are providing more income and employment than ever before.

In the Farm West, St. Louis is a leader in the manufacture of all kinds of clothing. Los Angeles is the principal center in the Far West and is the home of the distinctive California styles. In the Southwest the principal apparel manufacturing center is Dallas, which produces all types of men's, women's, and children's clothing, and especially is coming to the fore as a sportswear producing spot. San Antonio, Austin, Fort Worth, and El Paso are other textile-apparel cities. Since the war, clothing plants have been located at Decatur, Abilene, Gainesville, and Brownwood; and Vernon has acquired a work-clothing factory. These indicate a trend toward further locations of the textile-apparel industries in West Texas as well as other parts of the Southwest.

Significant Location Factors

Significant location factors which relate to the suitability of an area for textile manufacturing are listed below in a comparison of West Texas to the Southeast.

Location Factor	Southeast	West Texas
1. Homogeneous English speaking population	About the same	About the same
2. Availability of experienced labor	Available	Limited
3. Productivity of labor	Good	Good
4. Wage scales		Slightly lower
5. Housing	About the same	About the same
6. Cost of living	Below average	Below average
7. Competition with high wage industries	Little	Little
8. Labor legislation	Fair	Good
9. Taxation	Below average	Below average; no state income tax, no corporate income tax, no sales tax, community property law
10. Attitude toward industry	Good	Good
11. Local capital available	Limited	Ample
12. Climate	Mild	Mild
13. Cost of power and fuel	Low enough	Low enough
14. Quality and cost of water	Soft - low cost	Hard; moderate cost
15. Transportation	Adequate	Adequate
16. Accessibility to markets		
(a) East	Better	
(b) Middle West and Northwest		Better
(c) West and Southwest		Better
17. Accessibility to style centers		
New York	Better	
Dallas		Better
St. Louis		Better
Los Angeles		Better
18. Effect of buying habits	Favorable	
19. Convenience to executives and buyers	Nearer New York, Philadelphia, and Boston	
20. Proximity to population center of U. S.		Nearer
21. In line with trend of population and buying power		Nearer
22. Accessibility to raw materials	About the same	About the same
23. Accessibility to existing finishing plants	Nearer	
24. Cost of building	About the same	About the same

It will be seen from the above that most of the advantages favoring the Southeast come from the industry's already being firmly entrenched there. When mills have been built more extensively in West Texas, part of these advantages will favor this section, in addition to those which it already has. This would give impetus to any movement of the industry here.

West Texas Has Much to Offer

Decentralization of industry, brought about mainly by the War, seems likely to continue. What started as a defensive measure, probably will continue as such and as a means of more efficiently serving the expanding markets in the West and the Southwest. Small towns furnish the best location for textile mills.

West Texas has a great many of these small cities, and is served by 12,972 miles of railroad, 9,451 miles of which is first line main track. The mileage exceeds the total of any state in the Union with the exception of all of Texas. There are seven class-1 railroads.

Highway transportation has at its disposal 14,798 miles of paved roads, state and federally designated and maintained; also, 84,894 miles of improved secondary and farm-to-market roads. Twenty-four mainline federally designated highways serve and connect 95 percent of the area towns.

Commercial air lines blanket West Texas. This is of particular importance in view of the advent of air freight. Also, availability of air travel is an item of particular interest to textile executives and special personnel in New York, since this means of transportation will afford them less than a day's journey to this section. Often it is necessary for these men to travel to their mills and return to their offices in the East, within one or two day's time.

Freight rates for this section from a competitive standpoint are more favorable today than they ever have been. The Interstate Commerce Commission has boosted freight rates since before the war by 12 percent more for Eastern than for Western or Southwestern manufacturing in many lines.

The oil industry has long been big in this area. More recently the chemical industry has followed oil and other minerals here, but more especially to the Coastal region of Texas. Hope of the Southwest to become a great industrial area lies with future possibility of adding industries that will process the basic chemicals. The textile industry is one of the great users of chemicals.

Oil, also, is a basic raw material for synthetics; and a cotton textile industry which wanted to diversify its line of products, better to meet competition, would have a convenient source of synthetic fibers.

Fuel and power, so essential to any form of manufacturing, are abundant in West Texas and at an economical cost. Of the

U. S. natural gas reserve, 58 percent is in Texas and the major part is in West Texas. In 1947, 24 percent of the nation's new generating capacity was installed in West Texas by a public utilities company serving only a part of this territory.

West Texas is flat and lends itself to mechanized farming. The cost of cotton production is less than in East Texas and still less than in the Southeastern states. With the complete mechanization of cotton farming, including harvesting, a certain number of workers will be displaced and will be available for other work such as textile manufacturing.

There are many women available for work in cotton mills, whose husbands are working in heavy industry, such as oil. As yet, there is no industry in West Texas to furnish occupation to large numbers of women. Cotton textile manufacturing normally employs 60 per cent women. The work is light and not hazardous.

Latin-American labor available in West Texas, has been found highly satisfactory. These people are willing and competent workers, and work well togther in groups. They receive first preference in some lines of work. They are intelligent, uncomplaining, and are relatively easily trained to do manual tasks.

The Texas Legislature has enacted laws which go much farther than those of any other state toward the restoration of law, order, and fair dealing to labor-management relations. These laws set new and important limitations to union contracts, and they outlaw practices heretofore freely engaged in by labor unions.

This has been done to protect a way of life to which the people of this state are accustomed. Certainly in West Texas group labor disturbances are virtually unknown. The people here firmly believe in private initiative, and in protecting the property rights of free enterprise as well as the inherent rights of labor.

Texas has one of the most favorable tax structures of any state in the Union. Property taxes are below average; and in addition the state has no personal income tax, sales tax, nor corporate income tax, and has a community property law.

Essential to any textile industry is adequate commercial machine shop service to repair machinery and equipment. The entire West Texas area is dotted by many excellent machine shops, established mainly to serve the oil industry. These can adapt their services and facilities satisfactorily to textile industry requirements.

West Texas Has Valuable Source of "Know-How"

Texas Technological College, one of the three major state schools and a center of cultural life in West Texas, was founded for the purpose of teaching textile engineering. The textile school is one of the better equipped schools of the country, and as noted above, offers training in textile engineering, chemistry

and dyeing, weaving and design. In addition a textile engineering and manufacturing research program, sponsored by the Cotton Research Committee of Texas, is carried on here. This research program entails determination of fiber properties and spinning values of cottons; development of new products, new machines, and new processes; and studies directed toward the improvement of cotton processing control methods.

Since Texas Technological College opened in 1925, a considerable number of its textile graduates have gone into the industry, mostly in the Southeast. Most of these men are in high positions now, and most of them would return to Texas if they could find textile jobs here that would afford them the same high degree of success they have attained elsewhere. The school has served the textile industry well and can serve even better a textile industry located in this area.

Special Inducements

Special forms of inducement have been used by communities, for the purpose of acquiring industry. Some of these may be beneficial to both the town and the manufacturing establishment concerned. However, some investors and executives hold the view that an industry should stand on its own merits and that special inducements, rather than an aid, are a hinderance to a plant which has been set up in a new location. An official of one state says that, while his state itself offers no gifts of sites or tax exemptions, some local counties and towns do make sites available and give tax exemptions for a certain portion of taxes for a five year period.

Mississippi gives five-year ad-valorum tax exemptions to new industries and Louisiana gives ten-year exemptions. An official of the former says that several industries have been established in his state with purely local participation in the capital structure, under purely local arrangements. He says Mississippi is the only state in the Union in which communities can, by law, issue bonds to construct buildings to house industries, with the buildings to be paid for through rent on a long term lease.

Interest and Intelligent Action Are Best Inducement

One of the strongest inducements to industry is the interest and understanding of local bankers. Industry must have extension of credit to meet payrolls and buy raw materials. This may not be absolutely essential to an outside investor with large capital; but the friendly, helpful attitude of local banks may be the deciding factor in persuading him to locate in a particular community.

A vigorous integrated education and research program, with the interest of bankers, businessmen, prospective employees, and other citizens of West Texas, will give a needed impetus to a movement of the textile industry to this section. Immediate, continuous, concerted action should be taken. The

people here should not expect to reap a bonanza, but rather, to build a solidly founded industry, established on sound economic principles, which will grow by its own merits. Thus, they will avoid the inadvertent acceptance of any chance nostrums in the guise of guaranteed get-rich quick schemes.

The Report

Purpose and Scope of the Survey

This survey was made to determine the possibilities for cotton textile manufacturing in West Texas and Eastern New Mexico. The outlined procedure is (1) to define the cotton textile industry and to present general economic information concerning its rise, present status, and future prospects; (2) to explain the requirements for cotton textile manufacturing, including capital investment, raw materials, labor, water, power and fuel, and transportation requirements; (3) to show the comparative cost and availability of each of these requirements, for proposed mills in West Texas and for established mills in the Southeast; and (4) to make recommendations concerning the type of products best suited for manufacture in West Texas mills, the optimum size, equipment, and capitalization for recommended mills, general locational recommendations, and suggestions for attracting the industry to the area.

The geographical area of West Texas is the territory lying west of a line drawn from the Red River southward to the Rio Grande through Gainesville, Denton, Fort Worth, Cleburne, Waco, and Lampases to Del Rio. The entire area of 162,500 square miles comprises approximately two-thirds of the state of Texas. It is 600 miles from the extreme eastern boundary of West Texas at Fort Worth to the westernmost city of El Paso, and approximately the same distance from the northernmost Panhandle towns to Del Rio at the southern tip. The boundary of West Texas has been indicated on each of the maps presented in this report; in addition, Eastern New Mexico is considered a part of the West Texas region.

Synopsis of the Cotton Textile Industry

The manufacture of cotton cloth is one of the largest industries in the United States. In 1939 it ranked third in the number of employees, being exceeded in this respect only by the motor vehicle industry and steel works and rolling mills. In addition, about one half of the South's 3,000,000 farm families grow cotton, and for most of these families cotton is the main source of cash income; also, it is estimated that 3,000,000 people have full-time or part-time jobs in ginning, marketing, and processing cotton lint and cottonseed. The following table shows the status of the cotton textile industry at the time of the 1939 census:

COTTON TEXTILE MANUFACTURING IN THE UNITED STATES, 1939

Number of establishments	1,248
Total persons employed	409,317
Wages	292,536,218
Cost of materials, supplies, fuel, purchased electric energy, and contract work	595,394,247
Value of products	1,168,171,469
Value added by manufacture	572,777,222

(1)

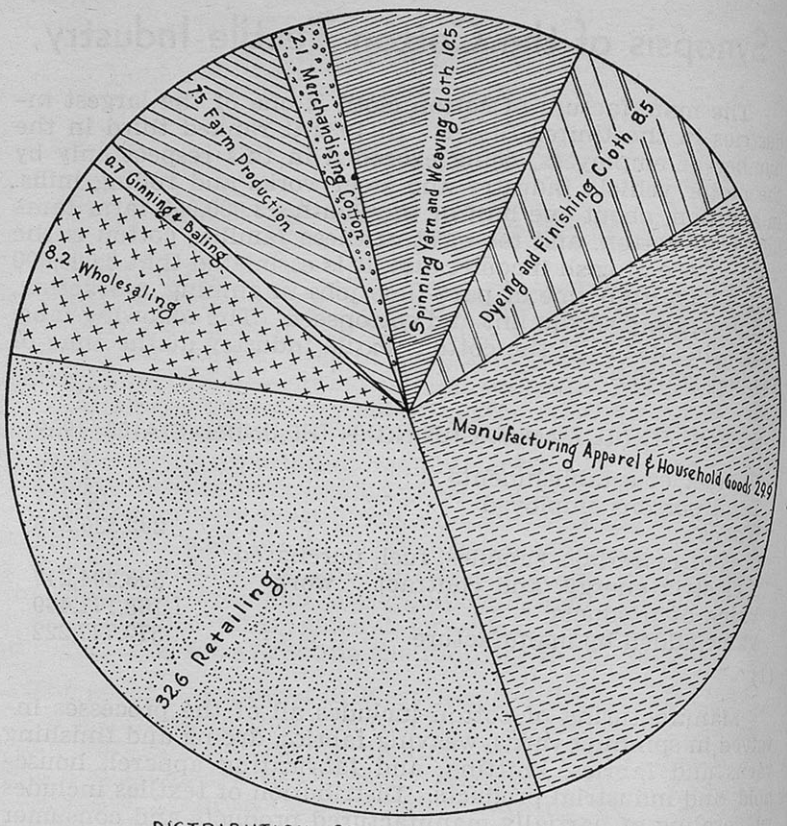
Manufacturing of cotton includes all of the processes involved in spinning yarns, weaving fabrics, dyeing and finishing yarns and fabrics, knitting, and fabricating apparel, household, and industrial products. Distribution of textiles includes wholesaling of partially manufactured products and consumer products by manufacturers and other wholesalers, and the retail distribution of finished textiles to ultimate consumers. The costs of these manufacturing and distributing processes account for about 90 percent of the consumer's dollar paid for cotton clothing and household products. The manufacturers' margins alone averaged about 49 percent in 1939, and the wholesale and retail margin was 41 percent. This distribution of margins is illustrated in **Figure 1,** which shows that of every dollar spent on cotton textiles in 1939, only 7½c was paid to cotton growers.

Figure 2 shows the typical distribution of a bale of cotton, and the processes through which the raw cotton may be put to convert it to its final form for apparel, household, or industrial use. These processes may be summarized briefly as follows:

1. Raw Material

The raw cotton is first ginned and baled. Baled cotton is classified according to grade, staple and character at a concen-

(1) 16th Census of the United States, 1940: Manufactures', 1939. U. S. Department of Commerce, Bureau of the Census (1941).



DISTRIBUTION OF CONSUMER'S DOLLAR PAID FOR COTTON APPAREL AND HOUSEHOLD GOODS

SOURCE: U.S. DEPT. OF AGRICULTURE, BUREAU OF AGRICULTURAL ECONOMICS

FIGURE 1

tration point from which the tagged bales are sorted and reshipped, or stored at a compress. When reshipped, cotton may be routed to domestic consumers or diverted to the export market.

2. Spinning process

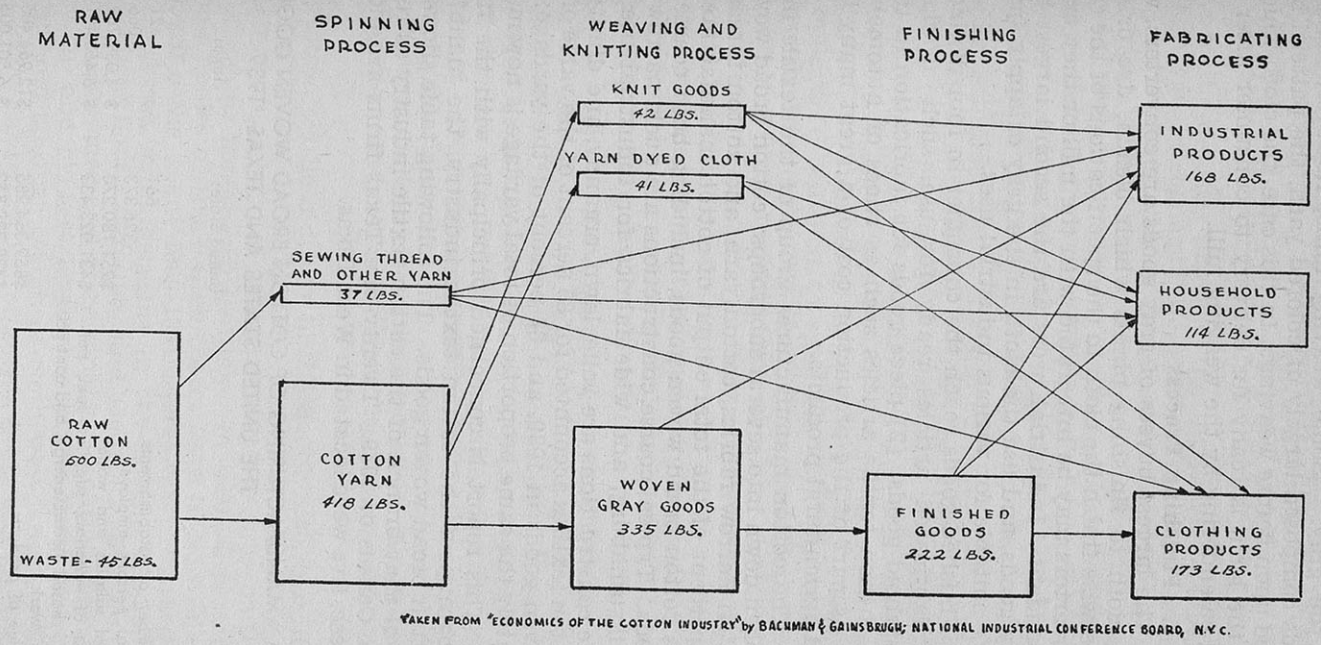
Mills and spinners buy specific grade and staple-length cotton through commission brokers or representatives in the mill market, and spin the raw cotton into yarn. Yarn manufacture is integrated to a large extent with further manufacturing processes; only 15 percent of the total output of cotton yarn is classified as sales yarn. Sales yarn is sold to manufacturers of knit goods and hosiery, insulated wire, narrow fabrics, and lace curtain materials.

3. Weaving and knitting process

Weaving and knitting mills generally produce gray goods from uncolored yarns, in standard constructions such as print

DIAGRAM OF PROCESSES AND PRODUCTS OF THE COTTON INDUSTRY

SOURCE: U.S. DEPT. OF AGRICUTURE



TAKEN FROM "ECONOMICS OF THE COTTON INDUSTRY" by BACHMAN & GAINSBRUGH; NATIONAL INDUSTRIAL CONFERENCE BOARD, N.Y.C.

FIGURE 2

cloth, sheetings, and duck, to be sold in unfinished state, or "in the gray." Some weaving mills, however, make colored goods composed largely of colored yarn, the pattern being decided upon before weaving. In this case, the cloth which comes off the loom is ready for delivery to consumer after washing and calendering by the weaving mill.

4. Finishing Process

The largest buyers of gray goods are converters, who send the cloth to finishing plants which bleach, dye or print, or otherwise finish the cloth to the specifications of the converter. Converters may be integrated with the mill or they may be independent. Industrial users are the second largest buyers of gray goods, and use the cloth in the gray or apply special finishes suitable for various industrial uses.

Finished goods reach the consumer in four distinct forms: (1) fabricated articles ready for use, such as clothing or household goods; (2) piece goods for fabrication in the home; (3) in non-textile articles such as shoes or automobiles and; (4) as part of the production cost of a great many industrial and agricultural products.

The cotton manufactures group of the textile industry is broken down into several subgroups; cotton broad woven goods, cotton narrow fabrics, cotton yarn, and cotton thread. About 75 percent of the total output of cotton manufactures in 1939, was cotton broad woven goods, including both coarse and fine goods. Typical coarse constructions are duck, narrow sheeting, drill, osnaburg, and wide fabrics for industrial use. Typical fine constructions are voile, lawn, organdy, and dimity. Coarse cotton textiles accounted for 85 percent of the value of all broad woven goods in 1939, and 88 percent of the yardage; approximately the same proportion of total yardage is now maintained.

This report is concerned principally with the first major subgroup of the cotton textile industry, the manufacture of cotton broad woven goods. The following table shows the status of that branch of the cotton textile industry as reported by the Census of 1939. Twenty-one Texas firms are included; of these, five were located in West Texas.

(2)

MANUFACTURING OF COTTON BROAD WOVEN GOODS IN THE UNITED STATES AND TEXAS, 1939

	United States	Texas	Percent Texas to U. S.
Number of establishments	661	21	3.0
Total persons employed	325,373	6,066	1.9
Total salaries and wages	$251,180,270	$ 4,039,769	1.6
Cost of materials, supplies, fuel, purchased electric energy, and contract work	$431,023,433	$ 6,463,401	1.5
Value of products	$869,354,285	$12,964,406	1.5
Value added by manufacture	$438,330,852	$ 6,501,005	1.5

(2) **16th Census of the United States, 1940: Manufactures', 1939.** U. S. Department of Commerce, Bureau of the Census (1941).

The Cotton Textile Industry in the United States, 1790 to 1948

The textile industry has been the "historical forerunner of mechanization" in economic life, and has provided elementary training for workers who later moved to more highly skilled trades. It was with the mechanization of the textile industry that the Industrial Revolution in England was begun. The manufacture of textiles first turned New England from commerce to industry; and the founding of a southern textile industry was the beginning of the industrialization of the South.

Cotton manufacture in the United States was begun in 1790, when the first successful cotton factory, with 72 spindles, was established in Pawtucket, Rhode Island by Samuel Slater. During and following the War of 1812 the shutting off of British goods provided a great stimulus to American cotton manufacturing, and the number of mills grew rapidly. These first cotton mills were confined to spinning yarn for weaving in the household, and until 1820 about 65 percent of the textiles used in the United States still were woven in the homes. A complete cotton spinning and weaving factory was established in 1813 at a waterfall on the St. Charles River at Waltham, Massachusetts; this was the first factory in the world in which all the processes for converting cotton into cloth by means of power machinery were carried on within one building.

The availability of water power was the determining factor in establishment and rapid development of the industry in New England. Until 1850, water power was so cheap and plentiful that steam power generated from purchased coal could not compete with it. The smaller streams were eventually developed to their utmost capacity, and mills were handicapped by fluctuations in their power supply, caused by floods as well as droughts. The eventual use of steam as a source of power permitted the building of mills away from water-power sites.

The cotton textile industry in the South, also, had its beginnings in the Pre-Revolutionary period, but New England dominated the market for cotton manufacturing until the latter part of the Nineteenth Century. In 1880, 80 percent of all cotton spindles of the United States were in New England mills. During the years 1880-1904 there was a marked expansion of cotton manufacturing in the South, especially in North Carolina, South Carolina, and Georgia. The industry in the South expanded at a more rapid rate than its New England division, and by 1914 leadership in the manufacture of the coarser and cheaper grades of cloth was definitely taken by the South. Electrification of cotton mills was accelerated about 1910, so that by 1923 more primary horsepower was furnished by electric motors than by steam engines.

A major migration of the cotton textile industry from New England to the South started in the Twenties. Lower taxes, plentiful labor supplies, favorable wage differentials, less social legislation permitting longer hours and night work, newer machinery, adequate power, and proximity to raw materials were factors contributing to the shift. During the period 1925-1945 the total number of spindles in place in the United States declined, with the New England states bearing the brunt of the decline. The proportion of spindles in place located in the cotton-growing states increased from 46.5 percent in 1925 to 77 percent in 1948. The location of cotton looms has shown a similar shift, with the proportion in the South increasing from 56 percent in 1925 to 79 percent in 1945.

Within the last two decades the South has lost a number of its peculiar advantages over New England in respect to textile manufacturing. Wage differentials have been narrowed by national labor legislation and unionization; taxes were reduced in the North and increased in the South, and there has been considerable legislation restricting employment practices in Southern states. Nevertheless, textile mills constitute the largest single industry group in the South, and textile mill products employed about 32 percent of Southeastern industrial workers in 1948.

At the present time, 34 states have cotton mills and finishing plants, but nearly 2/3 of the cotton spinning mills in the United States are located in North Carolina, South Carolina, Georgia, and Alabama. New England mills, about ¼ of the total, have specialized in the production of finer grade cloth while those in the South have specialized in cheaper staple goods. **Table I** (appendix) shows the distribution of spindles in place in cotton mills by sections and states from 1900 to 1948. This table shows that North Carolina now leads all other states with a total of 5,916,000 spindles. The number of spindles in Texas has increased from 49,000 in 1900 to 239,000 at the present time; of these, about 58,000 or 24 percent, are located in the five West Texas mills. In 1947, the total investment in all textiles in the South was estimated at $1,929,000,000; 48 percent of the nation's manufacturing investment in textiles. (3). Total investment in cotton textile mills for the state of Texas is estimated to be approximately $7,000,000.

The map of Texas **(Figure 3)** shows the location and productive capacity of each cotton textile mill in Texas. **Table II** (appendix) summarizes the available information concerning each of these mills, and shows locations, capitalization, products manufactured, number of spindles, type of power used, number of employees, means of sale, bales of cotton and grade and staple length of cotton used.

A recent survey indicates the continuation of the movement of cotton textile mills away from the Northeastern states

(3) Caldwell R. Walker, "Doubling of Invested Capital Underlies Southern Growth," in Manufacturers Record, (May, 1947).

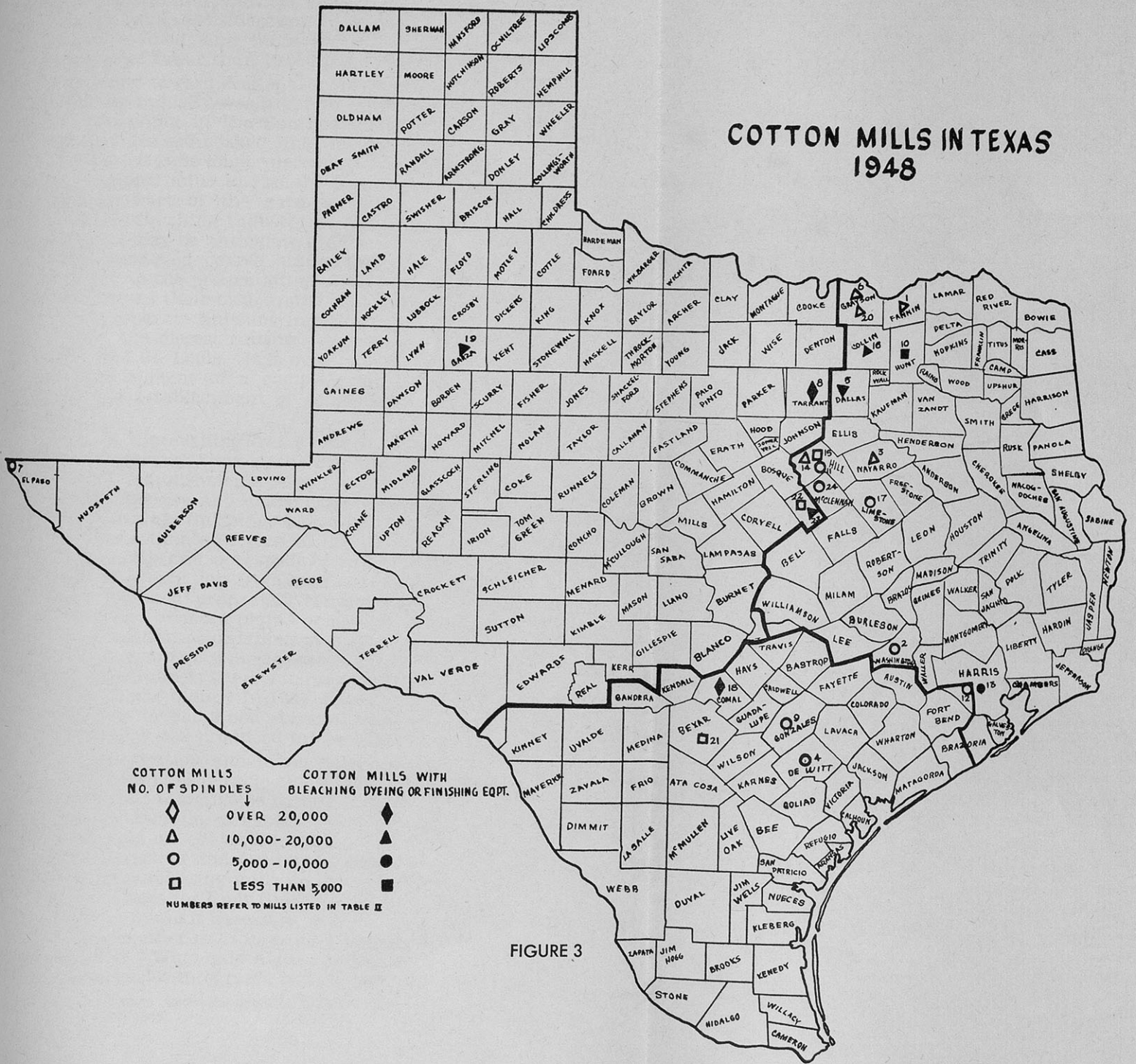
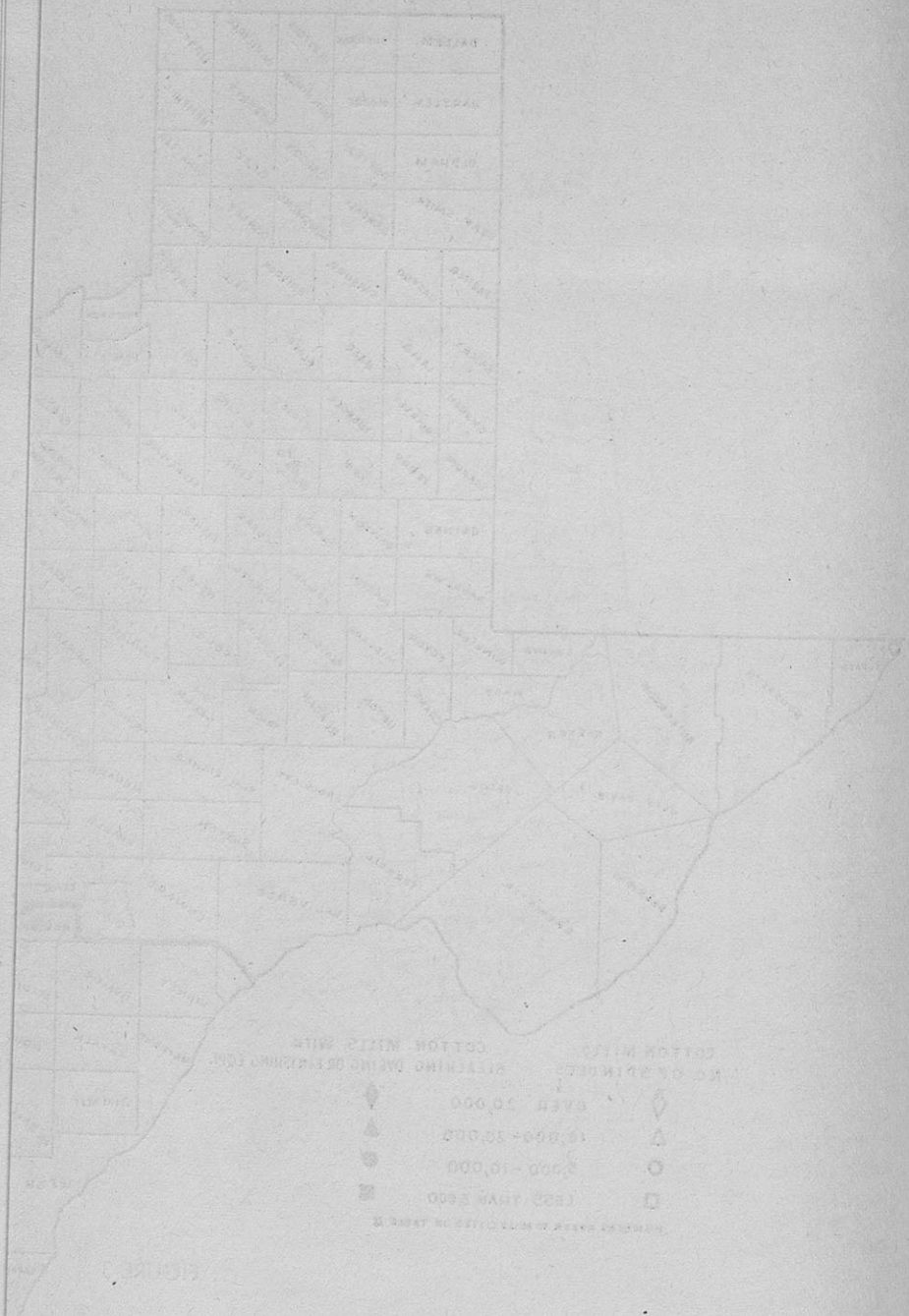

COTTON MILLS IN TEXAS
1948
COTTON MILLS
NO. OF SPINDLES
OVER 20,000
10,000 - 20,000
5,000 - 10,000
LESS THAN 5,000
COTTON MILLS WITH
BLEACHING DYEING OR FINISHING EQPT.
NUMBERS REFER TO MILLS LISTED IN TABLE II

FIGURE 3



to North Central and Southern states. The availability of labor was the prime consideration in decentralization of textile companies studied, and there was a marked preference for small towns of fewer than 10,000 population. (4)

The trend toward sectional integration is evident, because the finishing industry was begun to follow the textile mills and is now expanding in the Southeast. Several of the largest companies have established finishing plants close to Southern mills, so that it is no longer necessary to ship gray goods woven in the Southern mills to Eastern finishing plants for further processing. Part of the garment fabricating industry has followed the finishing industry to the Southeast. A parallel development may be anticipated in Texas, where the first cotton mills produced coarse, unfinished goods. Several mills have turned to the production of finer fabrics, and five of the 24 mills now do their own dyeing and finishing. The organization of a separate finishing industry in this territory has not yet begun; the closest finishing plants to Texas mills are in Memphis and St. Louis. It is evident that a primary requisite to the development of a complete textile industry in West Texas is the establishment of conveniently located finishing plants.

There is a prevailing trend toward vertical integration in the textile industry, that is, the combination under one management of establishments representing two or more stages in the manufacture and distribution of the products, such as spinning, weaving, finishing, fabricating, wholesaling, and retailing. The ultimate in vertical integration would be a combined ownership and operation of establishments engaged in all stages of production from seed cotton to the retail distribution of finished products. Horizontal integration is the merging of two or more plants or establishments in the same level of production or distribution, such as the merging of two weaving plants or two selling organizations. The most common type of integration is the combining of spinning and weaving operations in one plant. In 1939, 80 percent of all cotton yarn was produced in combined spinning weaving mills, and less than 20 percent was produced in specialized spinning mills.

The organization and management of some cotton mills have undergone considerable change during the last few years. Favorable profit margins led certain mills to integrate forward by buying or building finishing plants to take advantage of higher margins on converted goods. This made it necessary for some converters and custom finishing plants to integrate backward by purchasing mills, to insure a supply of goods and to obtain business for their finishing plants. Some textile mill selling houses found it necessary to practice horizontal integration by buying other mills in order to control a full line of products for sale. Wholesale houses and mills that owned their own sales agencies integrated both backward and horizontally,

(4) Paul W. Dickson, Decentralization in Industry. National Industrial Conference Board. (New York, 1948).

to control their sources of goods and to take advantage of better margins. Industrial firms using yarns and fabrics in the manufacture of other products found it desirable to buy cotton mills to assure of a continued supply of their requirements.

It has been observed that integrations in the textile industry appear to multiply with prosperity and to decline with depressions. Between 1944 and 1946, there were over 290 recorded sales of cotton mill companies, and about 2/3 of these involved some form of integration. Nearly 25 percent of the total cotton textile equipment in the United States changed hands. Since no new mills could be built during the war and new machinery was practically unobtainable, the traffic in mills was entirely in old plants and equipment. By October, 1947, almost 5 million of the South's 18 million spindles had been involved in integration purchases, and the value of textile securities went up 100 percent or more. Prices of plants rose from a low of $16 a spindle in the Thirties to $60 to $125 a spindle in 1947. In July, 1947, it was estimated that about 75 percent of the industry was fully or partially integrated, compared to 25 percent before the war. However, even with all the consolidating and buying of mills, no single combination at that time controlled more than 3 percent of the total production of cotton textiles. Some believe that the textile industry is entering a new era of large-unit operations in which a few companies will dominate the industry, but others are convinced that the industry will continue to offer good opportunities for individual units of small capital for some time to come. (5)

Most combined and specialized mills are operated under corporate ownership and control, and many of them are operated from central administrative offices. Only a few mills are owned and controlled by individuals, and an even smaller number are owned and controlled by partnerships and cooperatives. In 1939 there were only 34 non-corporate establishments among 661 mills.

Although only a few mills are listed on the New York Stock Exchange, there are a number of cotton mills with capital of over a million dollars, which have common stock issues. For the most part, the stock is held locally; it is characteristic of the industry that a great many of the average-size mills are family-controlled, and hence do not publish financial statements.

Cotton mills vary greatly in size, and the number of spindles in place is commonly used as an indicator of producing capacity. Mills with fewer than 25,000 spindles are considered small; mills with 25,000-60,000 spindles are in the medium class; mills with more than 60,000 spindles are in the large company class. There are some mills in operation today with

(5) Study of Agriculture and Economic Problems of the Cotton Belt. 80th Cong., 1st Sess., July 7 and 8, 1947.
"The Bolt in Cotton Textiles," in Fortune., (July, 1947).
J. A. Daly, "Southern Textiles Come of Age," in Manufacturers Record, (Oct., 1947).

more than 200,000 spindles, and there are a number of important companies that have mills in different areas, so that there are instances where more than 500,000 spindles are under a single management. However, even these important concerns are not in the large corporation class that is found in other industries. In 1942, 27 percent of United States mills had fewer than 10,000 spindles, 47 percent had 10,000-30,000 spindles; 23 percent had 30,000-100,000 spindles; and 3 percent had 100,000 spindles or more. (6)

Finishing is done on a much larger scale than weaving. For instance, yarn output from 250,000 spindles is needed to supply the cloth a printer can finish. Piece dyeing is on a smaller scale, but still requires the output of more than one mill for economical operation.

The textile industry has been operated on a relatively small scale, because expansion was accomplished by building new mills instead of adding to established plants, and because the technical processes of the industry do not favor extremely large-scale operation, but require relatively small units for maximum economy. For instance, studies made in 1938 determined that the low cost production of denims could best be secured by the operation of a mill with at least 35,000 spindles and 1200 looms; print cloth mills with 60,000 spindles represented maximum economy; and sheeting required mills with at least 30,000 spindles. (7) A 20,000 spindle mill with 500 looms is normally the smallest unit for maximum economy in the production of coarse gray goods.

The industry reached the peak in the amount of its productive equipment in 1925, when there were 37,885,000 spindles in place. During the last 13 years the size of the industry has decreased, so that in July 1948, there were only 23,779,000 spindles in place. This appears to be a sharp contraction in capacity, but actually it is not, because each active spindle in 1947 processed more than twice the quantity of cotton that the average spindle did in 1929. This increase in productive capacity with less productive equipment was due to the greater efficiency of the machinery, brought about by technological improvements, and, more important, the fact that multiple shifts have become the common practice, permitting longer hours of spindle operation.

(6) Study of Agriculture, op. cit., 120

(7) H. E. Michl, **The Textile Industries**, (Washington, 1938) 93-94.

Hiram S. Davis, et al., **Vertical Integration in the Textile Industries**, (Washington 1938).

The Marketing of Cotton Textiles

The tendency of the cotton textile industry from the outset was to disperse its manufacturing operations but to concentrate its selling functions toward central markets. New York became the focal point of textile distribution, because of its location and its transportation facilities and because of its position as the nation's financial center. The capital of the cotton merchandising world is Worth Street, a compact, half-dozen block commercial community; textile merchandising and Worth Street are synonymous in the trade. It is estimated that three-fifths of Worth Street business today is done through mill selling-house ownership or vice versa, and many smaller mills find the centralized distribution outlets of the big companies more valuable in disposing of their non-competitive productions than their own limited direct sales facilities could be. The merchant houses of Worth Street perform numerous related functions besides selling, such as assuming credit risks, furnishing practical styling related to the mills' equipment, promotions, advertising, and packaging.

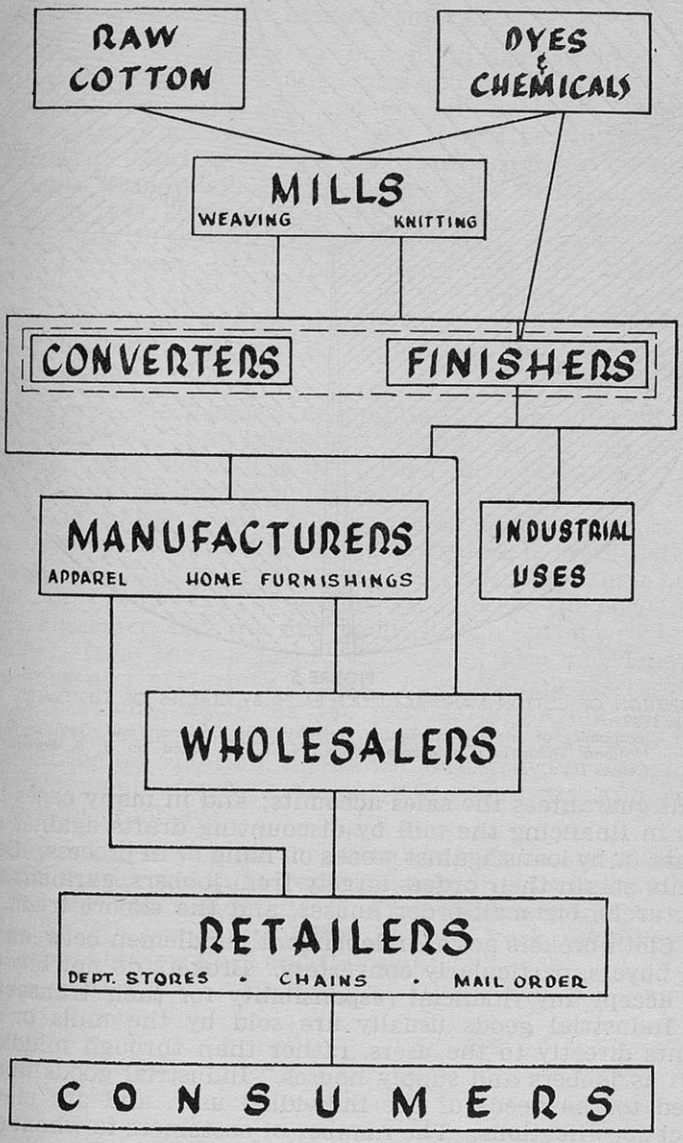
The channels of distribution in the textile industry are often devious and complex. **Figure 4** shows the alternate distributive channels through which it is possible for cotton to go; the specific marketing procedure depends upon the end use of the fabric. Apparel fabrics, for instance, are generally marketed through converters; industrial fabrics are sold by the mill to the industrial users. In 1939, 29 percent of all cotton broad woven goods finished and unfinished, was sold by mills to converters, while 26 percent was sold to industrial users. **Figure 5** shows distribution of cotton mill sales in 1939 by classes of customers. At that time, 46 percent of broad woven goods sold as gray goods was sold to converters, 25 percent was sold to industrial users, 26 percent was sold through the mills' wholesale offices or other wholesalers and jobbers, 1 percent was exported, and 2 percent was sold directly to retailers. (8)

Direct selling by the mill's own selling organization is common in the cotton textile industry. Mill selling-houses maintained by a few of the larger mills control the disposal of the products and arrange credits, thus saving the commission that must be paid when sales are made through other agencies. In smaller organizations, goods are marketed either by an officer of the company or by a salesman employed solely for that purpose. The business is generally transacted by the treasurer, who accepts the orders and arranges terms of sale.

The selling agent, sometimes called selling house or commission house, is a separate firm and in most cases is the sole agent for the mill whose goods it handles. The selling agent obtains orders, controls the shipment of goods, and advises the mills regarding their production policies. Usually the selling

(8) L. D. Howell, **Marketing and Manufacturing Margins for Textiles**, U. S. Department of Agriculture, (1945) 44.

COTTON TEXTILES
PRODUCTION & DISTRIBUTION



THIS CHART SHOWS IN SIMPLIFIED DIAGRAMATIC FORM, THE GREAT COMPLEXITY OF PRODUCTION AND DISTRIBUTION IN THE COTTON TEXTILE INDUSTRY.

FIGURE 4

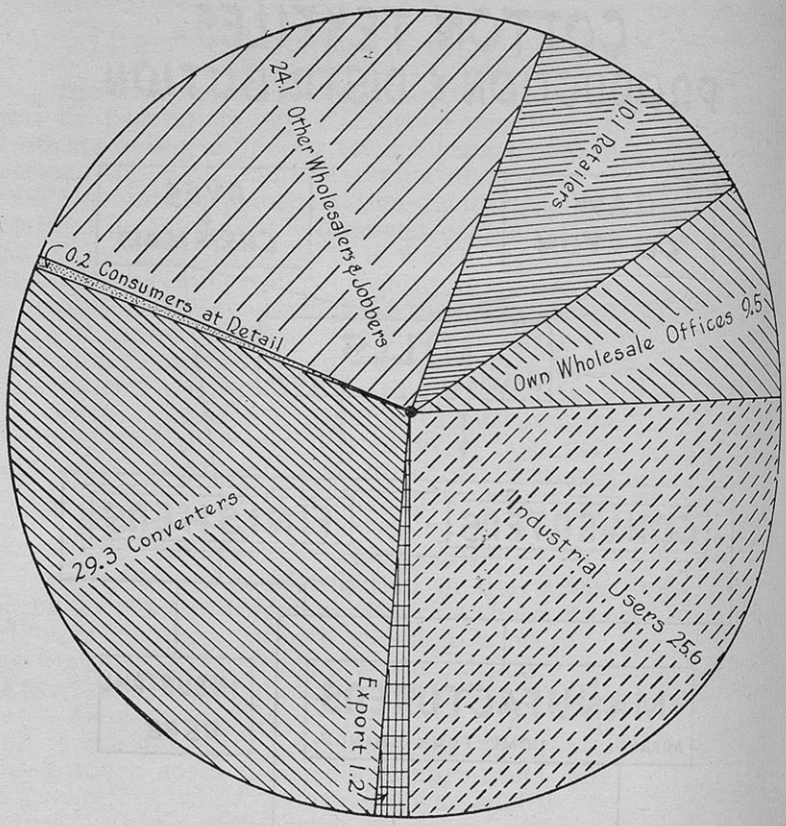


FIGURE 5

DISTRIBUTION OF COTTON MANUFACTURER'S SALES BY CLASSES OF CUSTOMERS, UNITED STATES, 1939.
Source: "Economics of the Cotton Textile Industry", by Bachman and Gainsbrugh; National Industrial Conference Board, N. Y. C. Based on U. S. Bureau of the Census Data.

agent guarantees the sales accounts; and in many cases it assists in financing the mill by discounting drafts against shipments, or by loans against stocks on hand or in process. Selling agents obtain their orders largely from jobbers, garment manufacturers, big mail-order houses, and the export trade.

Cloth brokers act as independent middlemen between mills and buyers, particularly converters. Brokers do not buy cloth nor accept any financial responsibility for their transactions.

Industrial goods usually are sold by the mills or their agents directly to the users, rather than through middleman such as jobbers and supply houses. Industrial goods must be fitted to the needs of the individual user, and are made to exact specifications. The number of customers to whom a mill would sell any one type of industrial goods is relatively small, and sales are made in large lots. In selling to the larger industrial buyers and to the wholesalers and supply houses that supply the smaller users, the mills operate through the same

agencies they use for other types of goods—mill selling offices and selling agents.

Because of the need for close cooperation on fabric specifications, between the weaver and the industrial consumer, industrial buyers have found it desirable to buy mills or set up new mills to make their fabrics. This policy has been carried farthest by automobile tire manufacturers.

Gray goods for apparel or household use is sold by mills to converters; often the selling agent acts as the converter, but sometimes the converter is an independent operator. The converter buys gray goods, decides how it will be finished, pays the finishing plant, and sells the finished goods to cutting trades or to wholesalers or to retailers for distribution to consumers. In 1938, 80 percent of the printing, 75 percent of the bleaching, and 90 percent of the piece-dyeing were done in independent finishing plants, mostly for converters. Since that time, however, many finishing plants have been integrated with spinning and weaving establishments; but these integrated finishing plants still do commission finishing for outside converters.

Factoring, the business of purchasing and collecting accounts receivable, is an important element in the distribution of textiles. The factor is a specialized form of banker whose place in the textile industry developed largely out of the functions of the selling agent. The relations between factors and the mills they finance usually are governed by very detailed contracts, and practically all these enterprises have their headquarters in New York. The factor may approve the account of a mill's customer, pay the mill cash for the customer's order, and collect from the customer. The factor also may lend the mill money and perform a number of miscellaneous services, such as providing facilities for selling, displaying, storage, shipping, and billing. Also, factors commonly give their customers advice on taxation, insurance, ownership organization, the development of new products, sales methods, and other management problems.

Texas mills employ all the sales methods described above. Industrial fabrics woven in Texas are sold directly to industrial users and through selling agents; gray goods are sold to converters through company offices in New York and through selling agents in New York and Chicago.

Markets for Cotton Textiles

The overall demand for cotton is directly related to the rate of business activity, and the major factor influencing the total demand for cotton textile products is the level of disposable income in the hands of the consumers. Demands for cotton textiles increase as incomes expand, but not quite at the same rate. Market outlets for textiles during the war and the immediate postwar period were more than adequate to absorb, at substantially advanced prices, all the cotton products that could be produced, and the industry experienced a period of unprecedented prosperity.

During the period from 1939 to 1946, the industrial use of cotton increased 25 percent. Consumption of cotton in 24 industrial markets, ranging from automobiles to awnings and tarpaulins, increased from 2,439,570 bales in 1939 to 3,051,250 bales in 1946. The greatest single increase was in automobile tires, where cotton usage jumped from 610,000 bales in 1939 to 764,340 bales in 1946, an all-time record. For all automobile uses, including tires, cotton consumption climbed from 696,330 bales in 1939 to 856,870 bales in 1946.

The consumption of cotton for apparel and household uses increased only 6 percent during the same period, 1939-1946—from 3,914,440 bales in 1939 to 4,162,020 bales in 1946. (9) This slower rate of increase may have been the result of competition with other fibers, particularly rayon. The table presented below indicates that civilian per capita consumption of rayon has more than doubled since before the war, while per capita consumption of cotton has increased only 7 percent.

NET CIVILIAN PER CAPITA CONSUMPTION OF FIBERS

(In Pounds)

	Total	Cotton	Rayon	Wool
1936-1940 (Ave.)	31.0	25.2	3.0	2.8
1941-1945 (Ave.)	32.2	24.8	4.3	3.1
1947	38.2	27.0	6.3	4.9

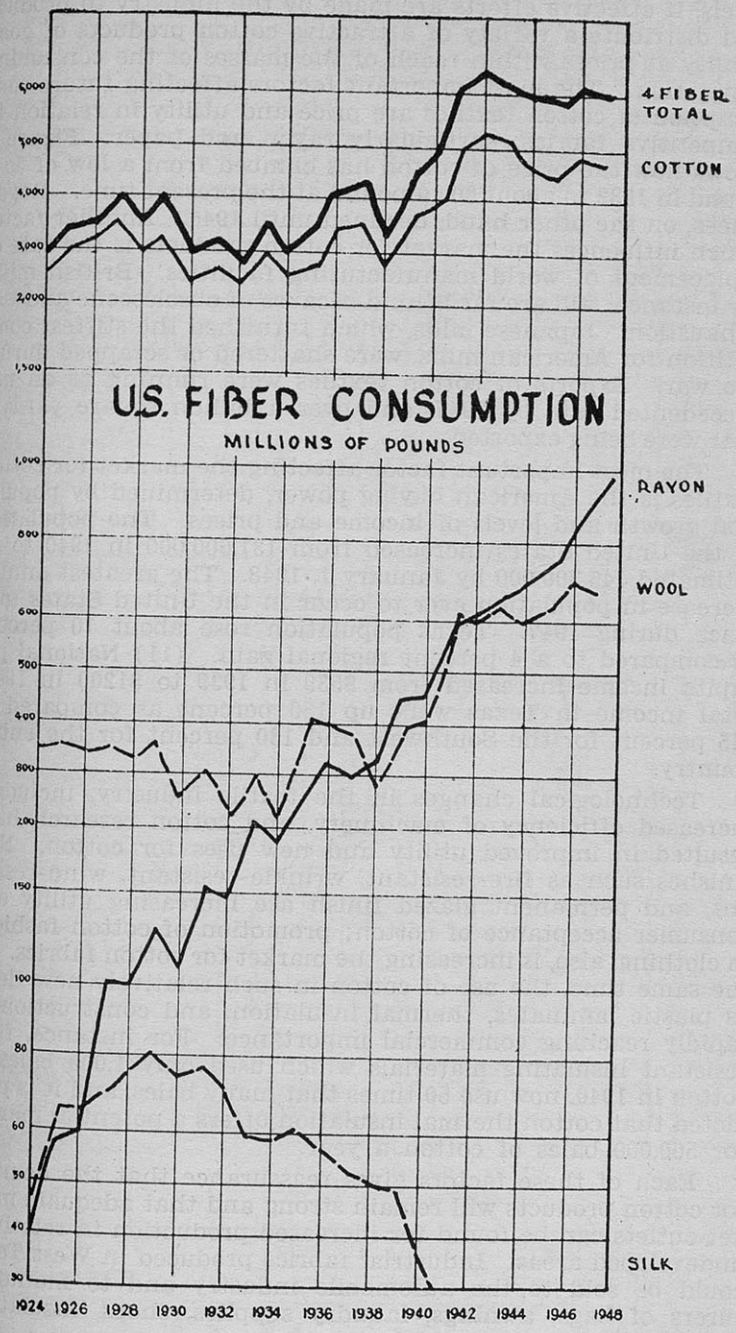
(10)

In spite of the more dramatic advances of rayon and other snythetic fibers, cotton still dominates the textile market, and cotton still accounts for 70 percent of total fiber consumption in the United States. This leadership of cotton fiber has never been disputed, although the margin between consumption of rayon and cotton has been narrowing, as indicated on **Figure 6**, which shows United States fiber consumption from 1924 to 1948.

Prospective demands for textiles indicate the possibility of maintaining cotton consumption considerably above pre-war

(9) **Cotton Counts Its Customers,** Supplement 2, (1947), Supplement 3 (1948) Memphis, National Cotton Council.

(10) Textile Economics Bureau,Inc. **Rayon Organon,** (June, 1948).



SOURCE: RAYON ORGANON, TEXTILE ECONOMICS BUREAU INC.

FIGURE 6

levels, if effective efforts are made by the industry to produce and distribute a variety of attractive cotton products of good quality at prices within reach of the masses of the consuming population. The most important factors affecting future consumption of cotton textiles are price and utility in relation to competitive fabrics, particularly rayon and paper. **Figure 7** shows how the price of cotton has climbed from a low of 5c a pound in 1932 to about 30c a pound at the present time. Rayon prices, on the other hand, declined until 1946. Another factor which influences the market for cotton products is the rate of replacement of world manufacturing facilities. British mills, for instance, still are far behind because of obsolescene and war exhaustion. Japanese mills, which furnished the stiffest competition for American mills, were shattered or scrapped during the war. Exports of cotton textiles were running at an unprecedented rate by 1947, and over a billion square yards a year were being exported.

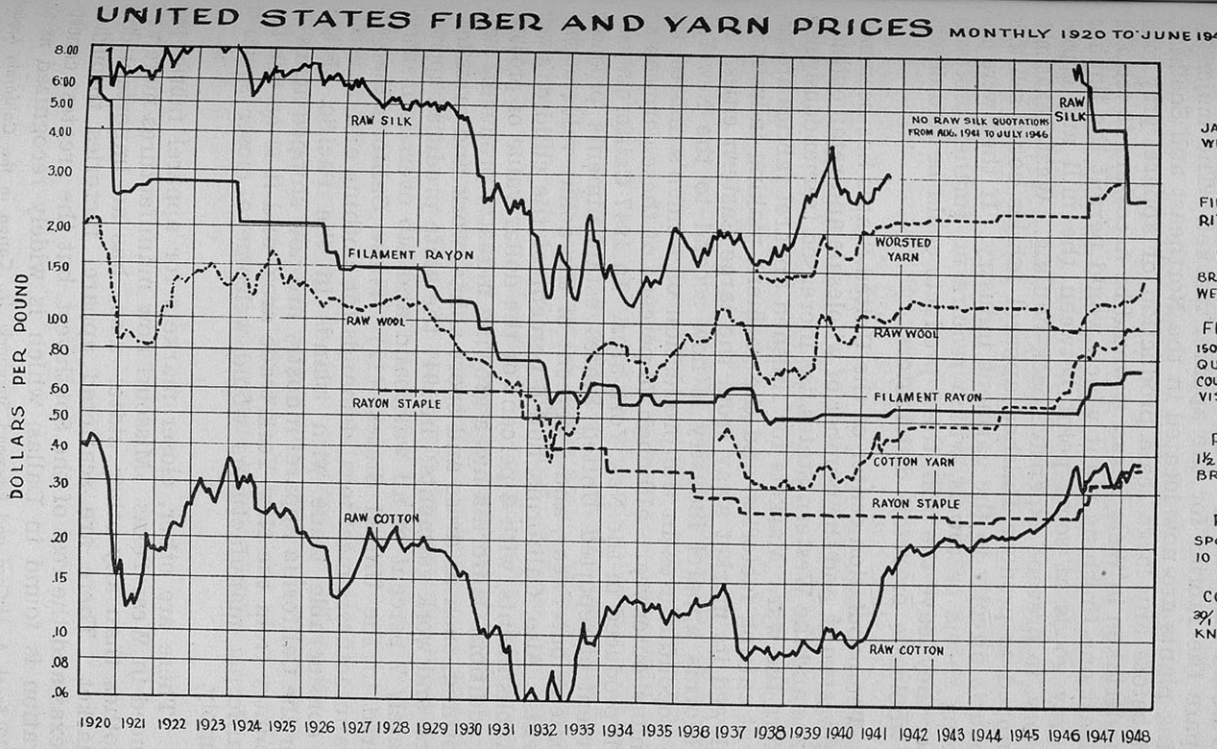
The most important factor affecting the market for cotton textiles is the American buying power, determined by population growth and levels of income and prices. The population of the United States increased from 131,600,000 in 1940 to an estimated 145,300,000 by January 1, 1948. The greatest annual increase in population ever to occur in the United States took place during 1947. Texas population rose about 10 percent as compared to a 4 percent regional gain. (11) National per capita income increased from $539 in 1939 to $1200 in 1946; total income in Texas went up 150 percent as compared to 145 percent for the Southwest and 130 percent for the entire country.

Technological changes in the textile industry, including increased efficiency of machinery, and cotton research have resulted in improved utility and new uses for cotton. New finishes such as fire-resistant, wrinkle-resistant, wind-resistant, and permanent glazed finish are increasing utility and consumer acceptance of cotton; promotion of cotton fashions in clothing, also, is increasing the market for cotton fabrics. At the same time, the use of cotton in such relatively new fields as plastic laminates, thermal insulation, and construction, is rapidly reaching commercial importance. For instance, fire-resistant insulating materials which used only 1,000 bales of cotton in 1940, now use 50 times that many bales, and it is predicted that cotton thermal insulation offers a potential market for 500,000 bales of cotton a year.

Each of these factors gives reassurance that the demand for cotton products will remain strong and that adequate market outlets can be found for increased production in relatively undeveloped areas. Industrial fabrics produced in West Texas could be sold to the automobile industry and to manufacturers of bags, awnings, laundry supplies, shoes, insulation,

(11) **Current Population Reports: Population Estimates**, U. S. Department of Commerce, Bureau of the Census, (March 10,1948).

The New American Market Reprinted from **Business Week**, (July 26, 1947).



SOURCE: RAYON ORGANON, TEXTILE ECONOMICS BUREAU INC.

FIGURE 7

and medical supplies. Together these industries consumed over 2 million bales of cotton in 1946.

Cotton mills in West Texas producing gray goods for apparel fabrics would market their products through selling agents acting as converters or through independent converters, who would have the gray goods shipped to finishing plants to prepare the fabrics for the apparel market. The major finishing plants are now located in the Northeast and Southeast, and before any large scale production of apparel gray goods is undertaken in Wets Texas, it would be necessary to establish at least one finishing plant which would permit the finishing of gray goods at some point between the mill and apparel factory, to prevent expensive back-hauling. West Texas mills equipped to produce finished apparel fabrics could sell their products directly to the garment industry. If they were producing sheets or towels, which require no further processing after they leave the mill, these products could be sold directly to wholesale or retail distributors.

The population center of the United States has been moving westward, and the number of wholesale and retail outlets in Texas and the Western States has increased tremendously since before the war. Markets for finished apparel fabrics are garment cutting factories, and the garment making industry has followed its market away from the large Eastern cities. The California apparel industry is now second to the New York metropolitan area in the production of women's, misses', and juniors' outerwear; although 70 percent of these garments are still produced in the New York area. In 1947 California had 8 percent of reported United States establishments producing women's outerwear, and 5 percent of the dollar value of shipments. Also, California had 6 percent of the children's wear establishments, with 3 percent of the dollar value of products. In addition, California has a growing industry producing men's clothing, such as dress and sport shirts, work and dress trousers, and work garments; in 1947 the state produced approximately 7 percent of all waistband and bib overalls manufactured in the United States. (12) These California apparel manufacturers meet local demands for clothing and, also, have a considerable trade with islands in the Pacific. Fabrics for the California apparel industry are now shipped across the country from the New York trade area, and it is certain that California manufacturers would welcome a closer source of supply.

There are other, closer markets for apparel fabrics produced in West Texas. Missouri now manufactures more work clothes than any other state; also, has an important dress market. There are scattered apparel factories throughout Texas and the rest of the Southwest, but the greatest concentration is found in Dallas, which is widely recognized as an

(12) Frank A. McCord and Raymond Steinback, Jr., **Cotton in the California Apparel Industry**, National Cotton Council, (Memphis, 1948).

apparel manufacturing center. Dallas factories produce clothing of all types, including men's and women's sportswear, children's clothing, dresses and blouses, and work clothing. Besides having a strategic location in relation to apparel factories on the West Coast, in the Midwest and the Southwest, West Texas can reach a potentially large market in Central and South America through Gulf ports.

In a recent study of locational factors in the cotton textile industry, it was concluded that textile yarn manufacturturing requires power and labor at competitive rates, with large manufacturing sites in localities where conditions permit reasonable living expenses. Weaving plants have the same requirements for power and labor at competitive rates, particularly in the larger units, but their requirements are more flexible.

Textile finishing plants require large supplies of soft water and good transportation facilities from the mills and to the market, and so they are always located in or near distribution centers. The final products of the textile industry, such as garments, are made in plants of various sizes generally situated where they can serve the market to the best advantage. For this reason the needle trades have been concentrated in large cities, particularly New York, which is the largest market for textile products.

Any section of West Texas can supply power and labor at competitive rates for combined spinning and weaving mills, and there are plentiful supplies of good water in certain parts of West Texas to support a textile finishing industry. There appear to be no insurmountable obstacles to the building of a complete textile industry in West Texas. When a substantial number of cotton textile mills, and at least one finishing plant have been established, a considerable portion of the garment industry may be expected to migrate to West Texas. While it is apparent that the textile industry can and should be developed in West Texas, there are certain requirements which must be discussed in greater detail in order that potential investors or industry-seeking localities may decide for themselves which particular area or which phase of the industry is best suited to their individual interests. Exact locational advantages or investment requirements can not be presented in a survey of this type, but certain general requirements can be presented to provide a basis for further detailed industrial surveys.

Capital Investment Requirements

Within a given area where conditions are favorable for development of an industry, the exact location of a plant may be determined less by technical advantages than by the residence of an individual who controls sufficient capital to promote local industry, or by the alertness of a locality in attracting industry by effective promotion. The comparatively new Southeastern cotton mill industry was built around the names of individuals whose control of capital enabled them to establish mills at or near their homes.

The amount of capital needed to establish units of the cotton textile industry is relatively small. The net capital investment per wage earner in 1942 was smaller for the textile industry than for nine of the other ten industries for which data were collected by the National Industrial Conference Board; the total net capital investment per wage earner for textiles was only $2471 as compared to $19,390 for chemicals and $8, 495 for food. (13) A special study made in Gastonia, North Carolina, in 1945 showed that the capital investment in cotton spinning and weaving mills averaged $2179 per worker, although the investment ranged from $754 to $4136 for competitive mills within the same community. The textile industry reported the lowest investment of any of Gastonia's manufacturing industries, which together had an average investment of $4289 per job. Two reasons were cited for the relatively low investment per worker in the textile industry; three-shift operations have been common in recent years, permitting the employment of more workers for the same amount of machinery, and accumulated depreciation of plant and equipment over several decades has resulted in a sharp write-down of the book values of many textile mills. (14)

The relatively small amount of net capital per wage earner in the textile industry helps to explain the larger number of producers in this industry as compared to others. Also, it makes it easier for new competitors to enter the industry. Not only is the capital required per wage earner smaller than in other major industry groups, but techniques in the industry lend themselves to relatively small-scale operations, and therefore, facilitate the entrance of new operators.

The exact amount of capitalization required for a cotton textile mill only can be approximated, since investment requirements vary according to size and location of the mill, products to be manufactured, business conditions at the time of building, and whether the plant is to be equipped with new or used machinery.

(13) Jules Backman and M. R. Gainsbrugh, **Economics of the Cotton Textile Industry** National Industrial Conference Board, (New York, 1946) 20.

(14) **Investment Per Job: The Case of Gastonia North Carolina.** Gastonia, N. C. Chamber of Commerce and Chamber of Commerce of the United States, (1945.

In 1945, for instance, a balanced mill making plain goods was estimated to cost $110 to $125 per spindle, in units of at least 20,000 spindles. Allowing for organizational costs, land, buildings, and equipment, a new spinning and weaving mill with approximately 20,000 spindles and 500 looms to produce 10 million yards of cloth per year, running two shifts, was estimated to cost at least $2,500,000. (15) These costs unquestionably would be greater today, if all new equipment were purchased; and costs would be considerably less if used machinery were installed. Also, it must be recognized that capital charges of existing mills, some of which were built at costs of $30 to $50 per spindle, are so low in comparison to those a new mill would incur that the net cost of production in the old mill would be lower, regardless of lower efficiency. However, many cotton mills are using their large war earnings to modernize and replace war-worn equipment and to build new plants, and some of these new plants can be built in West Texas. Plant executives may well decide that large scale improvements of worn out plants can best be made by relocation away from congested textile centers.

Between 1940 and 1945 a total of $21,500,000 was invested in 129 cotton textile plants in 12 Southern states, including Texas, an average investment of approximately $167,000. The investment in five Texas mills during those years was $274,000, an average of $54,800 per plant. (16) A 6,240 spindle Texas mill manufacturing duck and sheeting was sold recently for more than $350,000, or more than $56 per spindle. A 10,000 spindle mill in Arkansas recently has been purchased and the newly organized company is capitalized at $1,000,000. This firm was purchased by members of a Virginia finishing firm which has been processing corduroy and finishing rayon and silk; the Arkansas mill will be expanded and converted from number duck to corduroy production. (17)

The argument that a new plant in an undeveloped area would be at a competitive disadvantage with existing plants is valid but this argument does not apply to the textile industry any more than to any other industry, and apparently industry in general has decided to decentralize. The greatest industrial expansion is taking place west of Mississippi; 1947 estimates showed that while 31.8 percent of the population of the United States was west of the Mississippi River, 32.1 percent of the new plants and 39.9 percent of the new industrial investment were located in that area. Texas ranks sixth in population, but this state has had the greatest industrial investment since the war, with $230,800,000 spent for expansion. California, which

(15) Lockwood Greene Engineers, Inc., "Cotton Textile Manufacturing in Missouri" Report for the Missouri Department of Resources and Development (1945).

(16) Caldwell R. Walker, "Textile Manufacture - Second Southern Industry", in **Manufacturers Record**, (April, 1947).

(17) "News About Mills," **Textile World**, (July, 1948).

is now the third ranking state in population, has had the second largest investment in new industry, a total of $141,400,000.

The greatest portion of new industrial capital is going into relatively undeveloped localities, and 46 percent of all major industrial expansion projects undertaken since 1945 are in cities under 50,000 population. (18) The preference of the textile industry has always been for locations in smaller communities. The most favorable locations for cotton mills are in comparatively small, well-housed communities of less than 25,000 population, where a labor force can be recruited without bringing in workers from other places, and where there is sufficient housing to relieve the mill of the necessity of building houses for its employees. In the North, most wage jobs in the textile industry are in the principal cities of industrial areas, peripheries of such areas, and in important industrial counties. In the South on the other hand, more than half of the textile wage earners are found in predominantly rural areas; and most of the remainder are found in industrial counties, outside industrial areas. Many textile plants recently moved to the Southeast have been located in communities of less than 10,000 population. West Texas cities are generally small. One has a greater population than 200,000, one has more than 100,000, several are larger than 50,000, and approximately 12 are in the 10,000 to 20,000 class. The great majority of West Texas communities have less than 10,000 inhabitants.

Climatic conditions are not controlling factors in the location of manufacturing plants, but a factory located in a mild climate, such as is general in West Texas, has the advantage of operating with relatively low fuel and maintenance costs. One reason often cited for the location of the textile industry in New England is the existence of a cool, moist climate which makes the yarn more pliable and less likely to break. The manufacture of good yarn and cloth requires both humidity and temperature control, but the locational significance of temperature and relative humidity are being lessened by the introduction of air-conditioning, which permits year-around temperature control combined with air purification and humidity control. While climatic conditions have become less important, physical characteristics of industrial sites are more important now than formerly. Exact selection of a site may be determined by subsurface features, such as the strength of the strata for supporting the weight of buildings and equipment or for preventing vibration of machinery; floor and structure vibrations seem to be a unique problem of the textile industry. The character of the site affects the cost of plant building and the cost of installing machinery. Some factors which must be considered in choosing a site for textile manufacturing are drainage, foundations, accessibility to roadways, railway sid-

(18) Public Administration Clearing House, **News Bulletin** (March 29. 1948).

ings, and utilities, and availability of adequate room for plant expansion and parking space.

The best type of building for a cotton textile mill is reinforced concrete, and this building material is readily available in West Texas. The reinforced concrete building, if used with steel sash and doors, is almost ideal for cotton manufacturing, because it is fire-resistant and gives an unyielding floor for machinery.

The old-fashioned textile mill was a long narrow building of several stories, to permit maximum light and ventilation. The use of fluorescent lighting and modern systems of air-conditioning, combined with heating and humidification, have eliminated the necessity for old-style mill design, and architects and engineers can now design mills of any shape or size that is considered economical. The typical modern mill is a one story rectangular concrete building which has from 1000 to 1200 square feet to each column.

The framework of most cotton yarn equipment is used for many years, but the main working parts, such as gears, bearings, drafting rolls, spindles, and spinning rings are replaced as wear demands. In June, 1948 it was estimated that half of the spinning spindles in place in the United States were over 30 years old. (19) For a number of years before the war the industry was depressed, and needed replacements in equipment were not made. With the exception of manufacturers of opening equipment and of special parts, there are only three cotton-spinning machinery manufacturers in the United States. All the equipment and skilled labor of these manufacturers were used in the production of armaments, and the supply of repair parts and replacements for the textile industry was extremely short during the war. The industry is now replacing its worn-out equipment as rapidly as possible, and in August, 1948, it was estimated that textile machinery manufacturers had sufficient orders on their books to operate at full capacity for at least three years. It seems likely, however, that by the time the foundations for a textile industry in West Texas are completely laid, adequate machinery will be available—either newly built machinery, or equipment moved from existing plants. In addition to physical equipment, the textile industry requires nearby machine shops to service machinery. The presence of oil field equipment and other machinery requiring mechanical maintenance has led to the development of an efficint and widely distributed machine shop industry throughout the West Texas area.

(19) C. W. Bendigo, "PTI Seminar Called Post-Graduate Course", in **Textile World**, (June, 1948).

Raw Materials

Cotton is grown in 18 states, but the state of Texas grows more than twice as much cotton as any other state. Texas ginned 3,306,882 bales of cotton in the 1947-1948 season, almost 29 percent of the total ginnings in the United States, as indicated on **Table III** (Appendix), which lists cotton ginnings by states for the 1947 crop. Sixty-seven West Texas counties ginned 1,760,670 bales in 1947 - 1948, 53 percent of the Texas crop, and approximately 15 percent of the United States crop. West Texas, alone, produced more cotton than the rest of Texas or any other state; Mississippi, the second-ranking cotton producing state, ginned 1,515,333 bales. Four West Texas counties—Hockley, Lamb, Lubbock and Lynn—produced a total of 508,187 bales, 15 percent of the Texas total and one third as much as the state of Mississippi. The ginnings of the Texas 1947 cotton crop by counties are shown on the map, **Figure 8.**

Table IV (Appendix), shows the estimated grade and staple length of the Texas crop of 1947, approximately 70 percent of which was 29/32" and shorter. Principal staple lengths grown in West Texas are 15/16", with more than half of the West Texas crop consisting of 7/8" to 13/16" staple lengths.

Before the war about 80 percent of Texas cotton was exported, 14 percent was shipped to mills in the Southeats, 2 percent was consumed in the Northeast, and about 4 percent was consumed in Texas. Most Texas cotton now is being used by Southeastern mills.

Texas mills use local cotton almost exclusively, and their consumption of cotton has increased from 41,000 bales in 1910 to approximately 200,000 bales in 1946. In 1940-1941, 44 percent of the cotton consumed by mills in Texas was 15/16" and 31/32"; 35 percent was 7/8" and 29/32", and 8 percent was shorter than 7/8". (20)

Approximately half of United States cotton textile yardage can be made of cotton shorter than 15/16" staple. Fabrics made from this cotton are heavier in weight per yard than fabrics made of longer staples; therefore the amount of cotton used is more than half of the total. Cotton 7/8" and shorter is used for cotton blankets, thermal insulation, absorbent cotton, tents and awnings, men's underwear and socks, bath mats, dishcloths, and certain types of bags. Representative uses of cotton of 15/16" staple are fabrics for work clothing, automobile upholstery and lining, various types of hose, plastic laminates, and all types of clothing for men, women and children. **Table V (Appendix)** shows typical grades and staple lengths of cotton used for selected cotton fabrics and products, and, for each different grade and staple length

(20) John W. Wright and Fred Taylor, **Staple Lengths of Cotton Consumed in the United States in Relation to Staple Lengths Produced.** U. S. Department of Agriculture (1942), 16

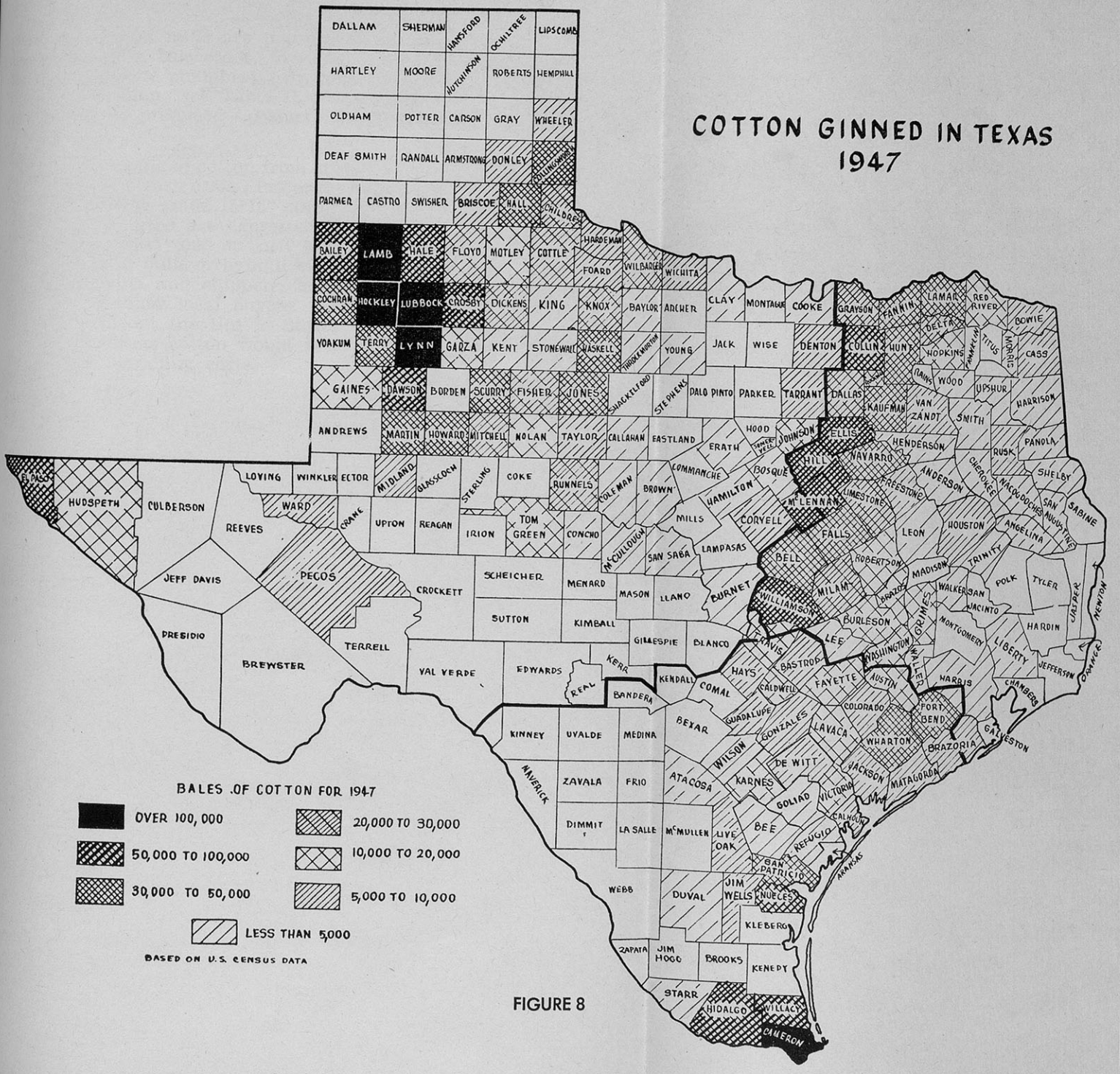
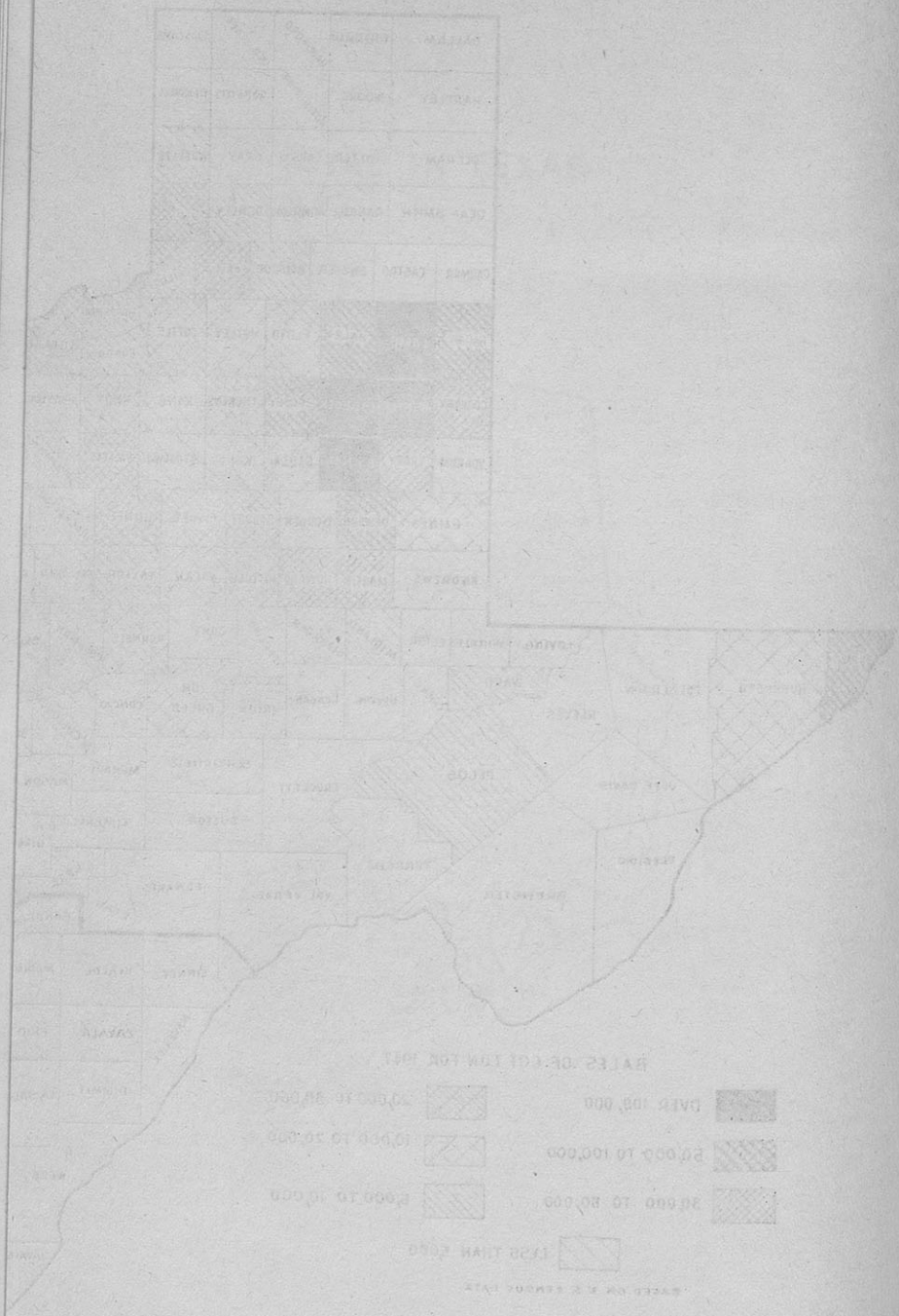

COTTON GINNED IN TEXAS
1947
BALES OF COTTON FOR 1947
OVER 100,000
50,000 TO 100,000
30,000 TO 50,000
20,000 TO 30,000
10,000 TO 20,000
5,000 TO 10,000
LESS THAN 5,000
BASED ON U.S. CENSUS DATA

FIGURE 8



listed, the total number of bales produced in the Texas, 1947, crop.

Texas cotton mills are manufacturing such products as sheetings, drills, bag goods, toweling, duck, osnaburgs, work denims, awnings, chambray, ginghams, and colored fabrics for work clothing; see Table II (Appendix). Most of these fabrics can be produced satisfactorily from cotton grown in West Texas.

The marketing of cotton from grower to spinner is handled all the way on a cash basis. Prices for cotton are quoted on the basis of Middling grade 15/16" staple, and the values of other grades and lengths are expressed as so many points (hundredths of a cent) "on" or "off" Middling 15/16". Most cotton is purchased by mills or by mill buyers, agents or subsidiaries, from merchants and shippers, but some is purchased from ginners and other local buyers. Cotton is sold at uniform prices throughout the United States, but a West Texas mill using West Texas cotton would save in transportation costs and certain handling costs.

Labor Requirements

The prime factor in the location of the cotton textile industry has been the presence of a relatively abundant supply of low-priced contented labor. The cost of labor is important in the industry, and because skilled operatives can be trained within a relatively short time, mills have sought locations where labor is plentiful and low-priced. Because the Southeast offered a supply of good textile labor at comparatively low wages, with other favorable conditions, the industry migrated to that section. National legislation governing hours and wages, and unionization have narrowed the wage differentials between various sections of the country, and the Southeast is no longer in a competitive position based primarily on low wages and long hours. Although markets and distribution facilities may replace labor supply as the primary locational factors in the textile industry, it is certain that the industry will locate only where there is an adequate and stable labor supply. The South has the greatest potential rate of labor force growth in the country, and there is a predominance of rural workers, displaced by mechanical farming; Texas has the largest part of the South's labor force. West Texas has a potentially desirable labor source in Latin Americans. It has been the experience of Texas employers that Latin Americans are contented and competent employees and that they work well in groups.

Texas Technological College at Lubbock, opened in 1925, was founded for the purpose of teaching Textile Engineering. This is the only textile engineering school west of the Mississippi River and it specializes in training men for managerial positions in the textile industry. Training is offered in textile engineerng, chemistry and dyeing, and weaving and design, leading to Bachelor of Science degrees. The college can be an asset to industry locating in West Texas, both as a source of trained personnel and technical advice.

The average number of employees per mill in the manufacture of cotton broad woven goods in the United States in 1939 was 492; plant work force in Texas ranges from 125 to 700 employees. It has been estimated that a 20,000 spindle mill making plain goods and running two shifts would require 500 employees, 60 percent female and 40 percent male. Many communities have made efforts to attract the textile industry becaues it gives employment to women for whom most smaller communities cannot provide other means of livelihood. Health records in the cotton textile industry are good, and there is nothing inherently unhealthful about the industry. A mill can train the bulk of its employees from inexperienced agricultural workers within a few months, because the skill requirements are generally low, except for supervisory jobs, such as overseer and third hand, and specialized jobs, such as loom

fixer and smash hand, which require high or moderate skill. Good vision and normal vigor are the only physical requirements for employment in cotton mills. Average weekly earnings in cotton manufacturing in April, 1948 were $43.08, and the average straight time hourly wage rate was $1.078. In May, 1948, Texas average hourly earnings in cotton broad woven goods were $.913. In making regional comparisons, however, it is important to remember that various types of cotton textile operations are distributed unevenly among the different sections of the country, and operations on different processes are paid at different rates. There are contrasts in wage rates not only between weaving and integrated spinning and weaving mills, but also between yarn mills and gray goods mills.

Water Requirements

Originally the location of textile plants was determined mainly by the quality and quantity of water supply available, but decline in water power and developments in the art of water purification have made the textile industry independent of naturally pure water supplies by assuring high-quality water at low cost. Practical experience in the manufacture of textile products has demonstrated that improvement in water quality is one of the most important factors in producing high-quality fabrics. It has been found that great economies, and improvement in quality, can be effected by further purification of water supplies which were previously thought satisfactory in their natural state.

Three qualities, turbidity or cloudiness, hardness, and iron are the main sources of trouble and irregularity in water for textile processing. Many ground supplies contain large amounts of iron and a little manganese. This water, if allowed to stand in open basins, usually will deposit a good portion of these elements. Water containing considerable sediment frequently can be treated and purified by flocculation, sedimentation and filtration, at a cost which is not prohibitive.

Hardness in water is due mainly to the presence of calcium and magnesium salts. Hardness determinations in a water analysis are always reported in terms of calcium carbonate and are given in three different manners, carbonate hardness, non-carbonate hardness, and total hardness. Carbonate hardness, due to the presence of carbonate and bicarbonate salts of calcium and magnesium, also is called "temporary hardness." Carbonate hardness can be partially removed by boiling, and further softening processes use lime and soda softener. Non-carbonate hardness, also called "permanent hardness," is due to the presence in the water of salts other than the bicarbonates, such as calcium sulphate; non-carbonate hardness is incapable of being destroyed by the action of heat, and more elaborate softening methods are required.

Most laboratories in the United States report hardness of water in parts per million, or p.p.m. Some water analyses, however, report hardness in grains per U. S. gallon, or g.p.g.; one grain per gallon is equal to 17.1 parts per million. The following general classification is used to describe natural waters: (21)

GENERAL CLASSIFICATION OF NATURAL WATERS

Hardness	Classification
Less than 15 p.p.m.	Very soft water
15 to 50 p.p.m.	Soft water
50 to 100 p.p.m.	Medium hard water
100 to 200 p.p.m.	Hard water
Greater than 200 p.p.m.	Very hard water

(21) W. H. and L. D. Betz, **Water Handbook** (Philadelphia, 1942).

Water for use in bleaching and dyeing must not exceed in hardness fifty parts per million of calcium carbonate and one part per million of iron. Hardness, like turbidity, may vary considerably over a short space of time, but unlike the latter, changes are not visible and may be unsuspected until trouble occurs.

The removal of hardness has been effected in several ways and various methods are in use, depending on the nature of the raw water, the amount consumed, and the use for which the water is intended. When moderate amounts of water of maximum softness are desired from moderately hard or relatively soft water, the zeolite type of softening is almost universally used. Water of zero hardness is commonly claimed to be obtainable with this system, and can be obtained with proper operations. Water containing up to 150 parts per million can be softened by the zeolite method; above this amount, either the lime-soda ash method or a combination of this with the zeolite is commonly used.

Finishing plants require tremendous quantities of suitable water; it has been estimated that 60,000 to 80,000 gallons of water per ton of product are required for bleaching, and that 8,000 to 16,000 gallons of water per ton of product are required for dyeing.

Besides the quantity of water for textile processing, industrial development requires additional supplies of water for commercial and domestic uses which may necessitate expensive enlargements of local water and other utility systems. Larger communities are more likely to have water supplies adequate for population additions; but in arid parts of the country the reservation of major portions of available water for agricultural and domestic use may leave an inadequate supply for industrial development.

It often has been said that the future prosperity of Texas depends in large part upon conservation and utilization of water resources of the state, surface and underground, for irrigation, municipal and industrial use. In 1947 2,400,000 acres of land in Texas were under irrigation from surface and ground water sources. The State Board of Water Engineers has pointed out that adequate water supplies are not now available in many areas that in practically all other respects have attractive industrial possibilities. This can be remedied in many localities by proper development of water resources, by means of storage reservoirs for surface waters and by further development of ground water resources. Surface water supplies are being increased and improved by construction of dams and reservoirs; **Table VI (Appendix)** lists the lakes and dams in West Texas, and proposed improvements. Ground water resources, also, are being measured and tapped; the High Plains section of West Texas has one of the largest underground water reservoirs in the world. (22)

(22) State Board of Water Engineers, **Progress Report** (Austin, 1946).

Most sections of the Southwest depend upon water from ground sources. In Texas, 681 of the 837 communities dependent upon public water supplies, obtained water entirely from ground sources in 1945. (23) Ground water is nearly constant in temperature, seldom varies in chemical character from season to season or from year to year, and usually is free from sediment. Ground water is relatively inexpensive, can be developed quickly, but tends to be more highly mineralized than surface water. In some places it is not suitable for irrigation, public supply, or industrial use, and in some localities, the quality is good but the quantity is inadequate.

Industries planning to establish plants in Texas in localities where ground water is available would require specific information concerning water supply, and it would be necessary for individual communities to supply this information. Questions most frequently asked by industrial engineers concern temperature and quality of water, depth necessary to drill, quantity of water available, decline in pumping levels likely after large withdrawals, and possibilities of salt water invasion. (24)

Individual communities also must see that proper provision is made for textile waste disposal. Textiles and dye works produce organic wastes, and most areas have water pollution regulations requiring the installation of waste treatment plants to remove or neutralize waste of this type. The textile waste treatment problem is more complex than other industrial waste purification because no two textile wastes are alike in character, and no two wastes are purified by exactly the same treatment. Combined waste from each mill continually changes with the introduction of new processes or changes in market demands. Wastes are as varied as the kinds and colors of goods produced.

(23) William A. Faught, "Problems Associated with the Utilization, Conservation, and Control of Water Resources in the Southwest", in **Monthly Business Review** (August, 1948).

(24) State Board of Water Engineers, **Progress Report** (Austin, 1946).

Power and Fuel Requirements

In the early days of the textile industry, power dictated the site of textile plants, and the record of change and growth in the textile industry, particularly in the South, is tied closely to the history of availability and application of power. The first cotton mills were located on water-power sites within mechanical transmission distance of the power source. The development of the steam engine was the first step in moving mills away from streams. As high voltage transmission of power became practical and economical and its availability increased in the South, textile plants began to be built, with the availability of labor and the proximity to raw material supply considered as more important factors.

Early in the electrification of cotton mills, 550 volts was adopted as standard for mill distribution and now is standard in approximately 95 percent of the mills of the Southeast. The kilowatt demand of cotton mills varies from 1,000 for small units to approximately 15,000 for the largest groups. Power is brought to the mill at high voltage and there transformed to the mill distribution voltage; substations usually are company owned. The average mill has a connected horsepower of approximately two times the maximum kilowatt demand, with the continuous load being nearly equal to the maximum demand. Nearly all mills operate 24 hours per day with two full shifts and one part shift; certain preparatory processing machines are operated on the part shift.

Mills entirely equipped with individually driven equipment ordinarily have an over-all power factor of 75 to 80 percent; those with a large share of line shaft drives average 82 to 86 percent. Some power companies in the Southeast have very attractive power factor rates, making the installation of capacitors to correct power factor a high return investment, and most such applications pay for the capacitors in one to two years. Other utilities provide an optional penalty which they may enforce if the maximum power factor drops below 85 percent. (25) A breakdown of power consumption in an average mill shows the largest share, about 50 percent of the total, is used in spinning; 20 percent for weaving; the remaining 30 percent is divided between opening, picking, carding, drawing, roving, warping, slashing, and miscellaneous uses such as lighting, ventilation, pumps, and elevators.

Almost all manufacturing plants must be located where they can be assured of a dependable and continuing supply of power. As long as this need can be met, relatively low power rates alone do not constitute a strong locational inducement, since power is often a minor cost element. In 1939, for

(25) American Institute of Electrical Engineers, **Electrical Power Applications in the Textile Industry**, (New York, 1947).

instance, power costs for the country as a whole represented 2.3 percent of the value of textile mill products. The national average for the textile industry was 1.03 cents per kilowatt hour. The Edison Electric Institute states that it has been its observation that the cost of purchased power is not a major factor in determining the location of textile plants. (26)

The map opposite **(Figure 9)** shows the principal generating plants and transmission facilities in the State of Texas. As this map indicates, West Texas is now adequately supplied with power facilities. In addition, important improvements and additions are being planned; in 1947, for instance, 24 percent of the nation's new generating capacity was installed by one public utilities company serving only part of the West Texas area. These developments leave little doubt that the power system of West Texas will support a growing industrial development.

Fuel, like power, is not a determining locational factor, but prospective industry must be assured of adequate fuel supply at reasonable rates. The Southwest has reserves of natural gas so great that demands of large scale industrial consumption can be met for a long period in the future, and the greater part of these reserves are in the West Texas area. Besides the relatively low cost of natural gas, especially when it is consumed close to the source of supply, many industries have found advantages in the use of natural gas because of the ease of handling, cleanliness, control of combustion, and low furnace maintenance. The table below shows the equivalent values of heat content in Texas fuels in relation to various prices of natural gas, based on heat content only and exclusive of transportation and handling charges.

EQUIVALENT VALUES OF HEAT CONTENT IN TEXAS FUELS

Natural Gas 1007 B. T. U. per cubic foot Dollars per M. Cu. Ft.	Texas Company Residium Gr. at 60 F.-8.0 H. W. 17,500 B. t. u. per lb. Dollars per Barrel	Texas Company Petrol. Coke 15,050 B. T. U. per pound Dollars per Short Ton
$ 0.10	$ 0.643	$ 2.990
0.11	0.708	3.288
0.12	0.772	3.587
0.13	0.836	3.886
0.14	0.901	4.185
0.15	0.965	4.484
0.16	1.029	4.783

(26a)

Most large industrial users of natural gas have special price contracts whereby the cost per thousand-cubic-feet is reduced for monthly consumption beyond certain fixed quantities. The initial price, fixed quantities, and amounts of reduction depend

(26) Edison Electric Intsitute, letter, May 5, 1948

(26a) Data from Houston Pipe Line Company, Houston, Texas

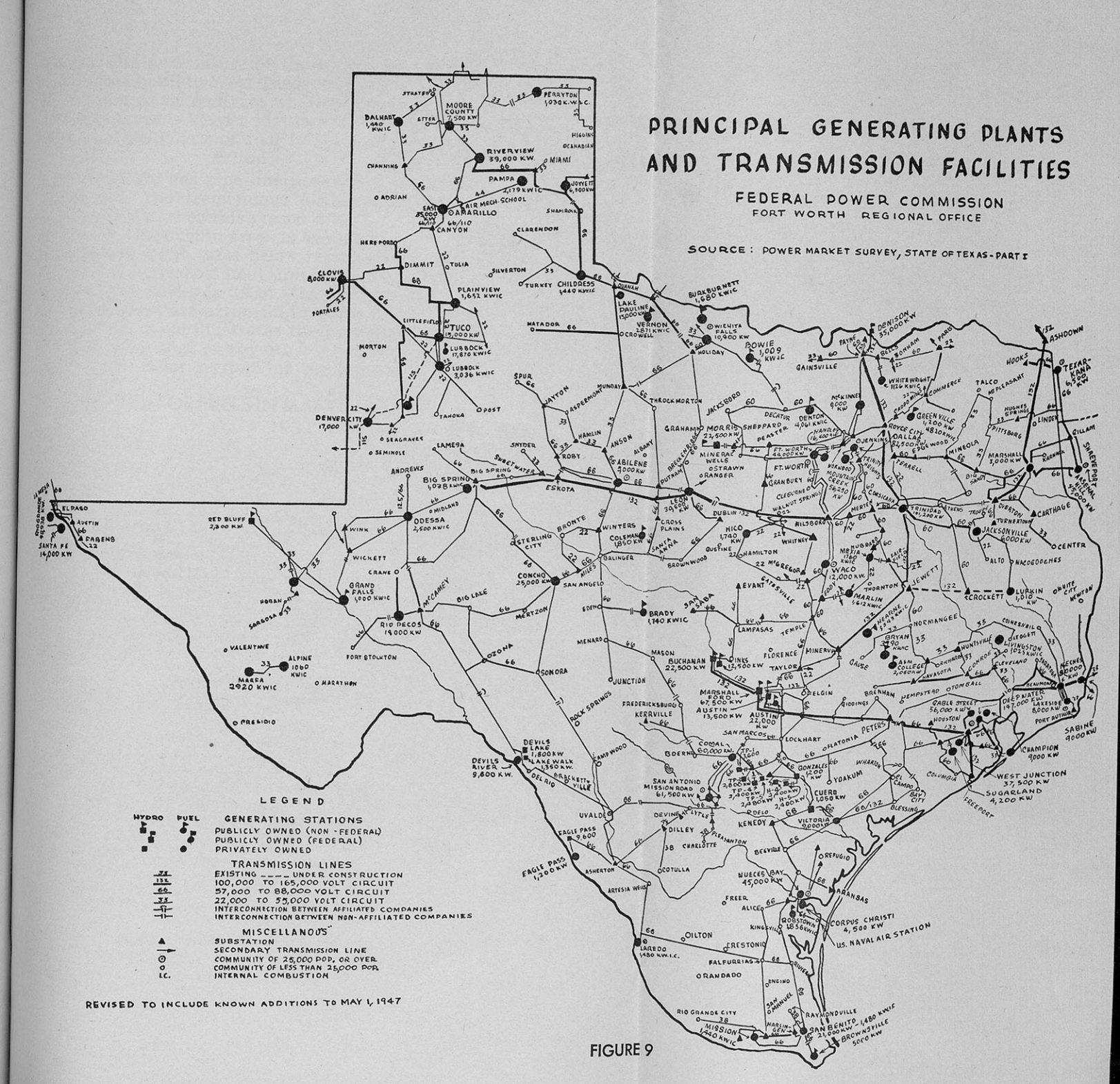
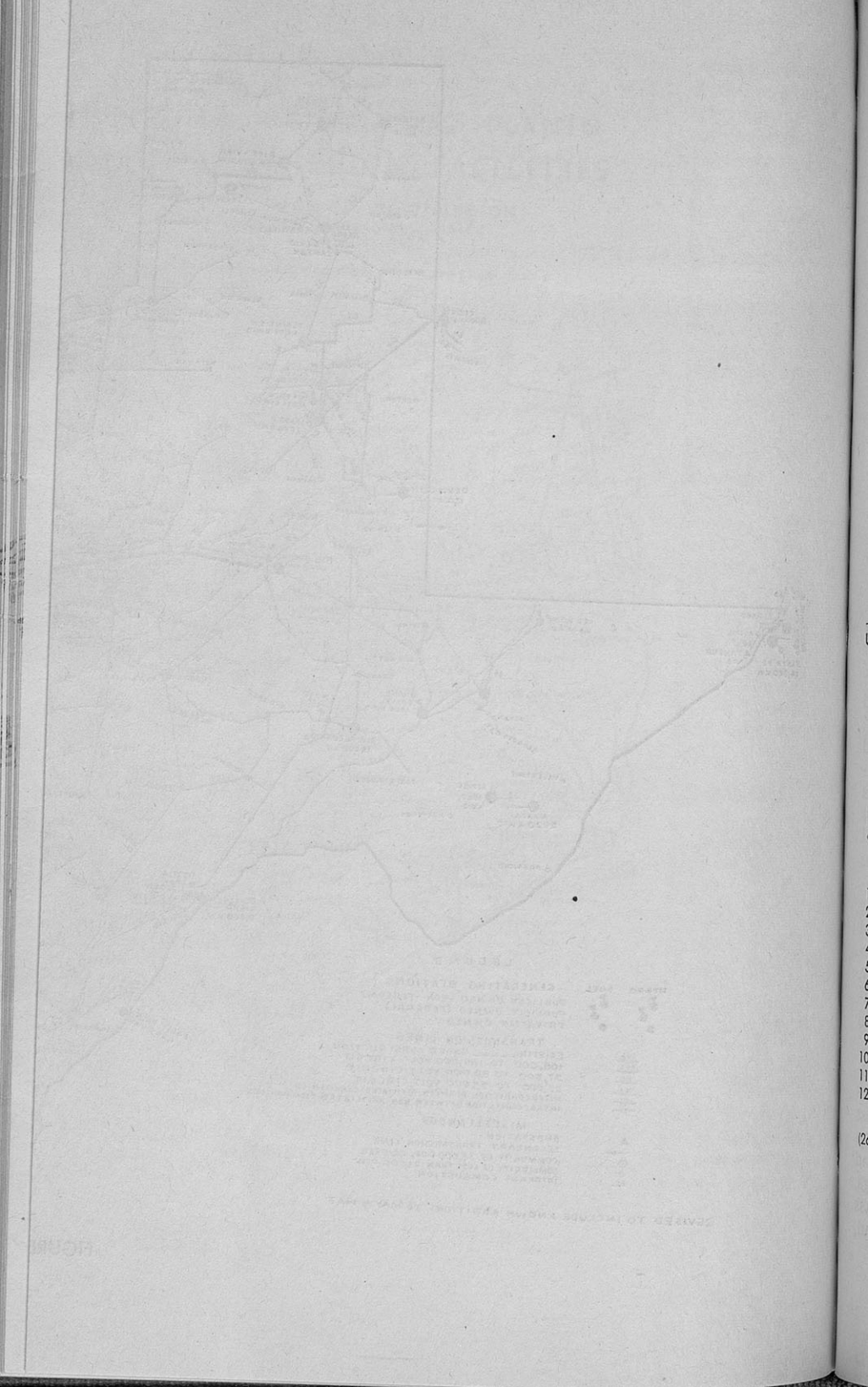

PRINCIPAL GENERATING PLANTS AND TRANSMISSION FACILITIES
FEDERAL POWER COMMISSION
FORT WORTH REGIONAL OFFICE
SOURCE: POWER MARKET SURVEY, STATE OF TEXAS - PART I
LEGEND
HYDRO FUEL
GENERATING STATIONS
PUBLICLY OWNED (NON-FEDERAL)
PUBLICLY OWNED (FEDERAL)
PRIVATELY OWNED
TRANSMISSION LINES
EXISTING ---- UNDER CONSTRUCTION
100,000 TO 165,000 VOLT CIRCUIT
57,000 TO 88,000 VOLT CIRCUIT
22,000 TO 55,000 VOLT CIRCUIT
INTERCONNECTION BETWEEN AFFILIATED COMPANIES
INTERCONNECTION BETWEEN NON-AFFILIATED COMPANIES
MISCELLANOUS
SUBSTATION
SECONDARY TRANSMISSION LINE
COMMUNITY OF 25,000 POP. OR OVER
COMMUNITY OF LESS THAN 25,000 POP.
I.C. INTERNAL COMBUSTION
REVISED TO INCLUDE KNOWN ADDITIONS TO MAY 1, 1947

FIGURE 9



upon the size and nature of the individual industry. For example a small mill in West Texas, which makes bleached goods, has a sliding-scale contract whereby its cost beyond a certain minimum figure is 12c per thousand-cubic-feet. The estimated average monthly cost of fuel in this mill would be about 17c per M c. f.

The natural gas pipe line network is limited in extent, as compared to the tremendous distances which oil and coal are transported. For this reason a large volume of surplus gas in the major producing areas is available for industrial uses at very low cost. The table below represents the total fuel consumption in equivalent heat units in manufacturing industries in the United States in 1939. Geographical areas and certain individual states are arranged in order by ascending unit cost of fuel. This table illustrates the fact that Texas with a fuel cost lower than that of any other state, has an undisputed advantage over other sections of the country in this respect.

CONSUMPTION OF FUELS IN MANUFACTURING INDUSTRIES 1939

	Consumption of Fuels Billion B. t. u.	Cost per Million B. t. u Cents
UNITED STATES	5,367,386	15.8
Geographical Divisions		
1. West South Central	510,948	6.6
2. East South Central	309,013	12.1
3. Mountain	123,612	14.9
4. Middle Atlantic	1,565,601	16.1
5. South Atlantic	452,176	16.3
6. West North Central	218,370	16.8
7. East North Cntral	1,715,751	17.7
8. Pacific	186,368	18.4
9. New England	285,518	20.8
States		
1. Texas	336,974	5.1
2. Alabama	182,439	11.2
3. Tennessee	59,843	13.6
4. Rhode Island	32,725	16.7
5. New York	392,241	17.5
6. New Jersey	224,578	18.5
7. Georgia	28,290	19.4
8. South Carolina	29,469	19.4
9. Massachusetts	139,856	19.9
10. Connecticut	66,404	20.9
11. North Carolina	36,270	21.4
12. New Hampshire	13,700	27.6 (26b)

(26b) National Resources Planning Board, **Industrial Location and National Resources** (1942) 166

Transportation

All raw materials used in the manufacture of textile fabrics can be shipped considerable distances economically, and therefore, location of textile plants has been governed more by economical manufacturing conditions and accessibility to markets than by location of the sheep range, the cotton field, or the synthetic fiber plant. In fact, the freight rate structure of the United States, by making it more economical to ship raw materials than finished products, has kept the Southwest dependent on raw materials extraction for its major income and has discouraged the more intensive processing of the Southwest's tremendous natural resources into marketable goods.

There are two principal kinds of freight rates, class and commodity. A class rate is a base rate from which rates on various commodities can be determined on a percentage basis. Almost every commodity is classified, that is, related to first class rates on a percentage basis, and there are lawfully published class rates for almost any commodity between any two points. In many instances the lawfully-published class rate will not apply because of a lower lawfully-published commodity rate. A commodity rate is applicable only to a specifically named commodity, and may or may not be based on distance. Commodity rates usually are designed to meet the demands of each particular situation, and these rates are changed to suit changes between railroads and particular industries.

There are five major freight rate territories in the United States, the Eastern or Official Territory, Southern Territory, Western Trunk Line Territory, Southwestern Territory, and Mountain-Pacific Territory. The Southwestern Territory includes the states of Texas, Arkansas, Oklahoma, and Louisiana west of the Mississippi River. Each freight-rate territory has its own system of rates, and each has a separate and distinct structure of rates applying intraterritorially. This sometimes results in variations between the intraterritorial and the interterritorial rate levels on the same commodity. A study made by the West Texas Chamber of Commerce in 1938 indicated that the Southwestern Territory was paying rate scales averaging about 60 percent higher than those of Official Territory. It is claimed that West Texas was being forced to pay approximately 60 percent greater transportation charges, on equal haul basis on such items as groceries and clothing.

The freight rate discrimination struggle to force the establishment of rate equality between freight rate territories has been raging for over twenty years. In 1940 Congress amended the Interstate Commerce Act to include a prohibition against undue and unjust discrimination among regions; and on May 15,1945 after much investigation and many hearings, the ICC handed down its final decision, finding that class rates were unequal, discriminatory, and therefore unlawful,

and calling for uniform freight classifications and complete rate parity for all territories of the United States. The ICC also ordered an interim emergency 10 percent reduction in class rates for the South, Southwest, and West, and a corresponding 10 percent increase in Official Territory class rates. The Supreme Court, on May 12,1947, upheld the ICC's fact findings, conclusions, and orders of May 15, 1945.

Thus, the beginning was made toward freight rate equality between freight rate districts, as far as the class rate system is concerned. Further efforts now are being made to obtain revisions in the much more important commodity rate structure. There are indications that the traditional advantage of Northeastern states over the Southwest because of preferential rate-making are losing their significance. Important changes in the entire freight-moving system of the United States may result from the recent Supreme Court decision which outlawed the "basing point" system of freight rates.

Textile mills in Texas now ship to every freight rate territory. The best market for their products is in Official or Northeastern territory, and the principal competition comes from Southern Territory, which manufactures fabrics of similar grades. Cotton textile mills in Texas now operate at a disadvantage because they have farther to ship, to finishing plants, garment cutters, or industrial consumers.

Table VII (Appendix) shows comparative freight rates to different section of the country from cities in the Southeast, Northeast, and from Sweetwater, a central point in West Texas. These comparisons have been summarized in the tabulation below. West Texas has a great advantage in freight costs to Denver and to the West Coast, but rates are generally higher for West Texas shipments to Chicago and Indianapolis.

SELECTED FREIGHT RATE COMPARISONS FOR COTTON PIECE GOODS - AUGUST 23, 1948

RATES ARE IN CENTS PER 100 LBS. - ANY QUANTITY

	From Sweetwater, Texas	From Atlanta, Georgia	From Boston, Mass.	From New York	From Greenville, S. Carolina
Cotton Piece Goods, Finished					
To Chicago	1.70	1.63	1.73		
To Indianapolis	1.70		1.64		1.49
To Denver	1.75	2.73	3.84		
Cotton Piece Goods, Unfinished					
To Chicago	1.54	1.45	1.56		
To Indianapolis	1.54		1.48		1.34
To Denver	1.58	2.46	3.48		
Cotton Piece Goods—Finished and Unfinished					
To San Francisco	2.38	2.85	3.15	3.15	

(26c)

(26c) W. B. Langford, Texas Engineering Experiment Station, A. & M. College

If West Texas mills were producing finished cotton goods, these could find markets at clothing factories within the Southwestern territory, in Missouri and other Middle Western states, and at clothing factories on the West Coast. For finished cotton goods, West Texas has a transportation advantage over the Southeast. For unfinished cotton goods and industrial fabrics, the Southeast has a freight cost advantage.

West Texas has adequate transportation facilities to move raw materials to cotton mills and to move the products of these mills to their markets. The area is served by seven Class 1 railroads, and five major commercial airlines. At least 100 common carrier lines and 125 contract carriers operate on West Texas highways, which total 14,798 miles of paved State and Federal roads and 84,894 miles of improved secondary and farm-to-market roads.

Taxation

Local tax rates in different sections of the country are difficult to compare because of the variance between assessments and variance in local policies regarding determination of market values of property. The same property might be listed at a wide range of market values in various communities, depending upon local policy. In addition, actual tax rates include rates levied per $1,000 assessed valuation for total of city, school, county, and state taxes, and the assessed valuation varies from 13 percent to 100 percent of "true" value. Below are listed the comparative 1947 adjusted tax rates for selected cotton manufacturing cities in the Southeast and in New England, and for cities in West Texas of more than 30,000 population in the 1940 Census. The tax rate listed for each city is the adjusted rate, that is, the rate on 100 percent basis of assessment. Assessed valuation in these cities varies from 13 percent to 100 percent of "true" value.

SOME COMPARATIVE TAX RATES FOR WEST TEXAS, SOUTHEAST, AND NEW ENGLAND

Southeast		New England		West Texas	
Charlotte, N. C.	$11.39	Fall River, Mass.	$42.80	Amarillo	$14.08
Greensboro, N. C.	24.82	New Bedford, Mass.	46.40	Austin	21.20
High Point, N. C.	22.41	Salem, Mass.	43.50	El Paso	28.60
WinstonSalem, N. C.	21.20	Lewiston, Me.	26.40	Ft. Worth	28.01
Columbia, S. C.	15.50	Manchester, N. H.	37.00	Lubbock	22.26
Greenville, S. C.	20.88	Nashua, N. H.	29.52	Waco	27.21
Spartanburg, C. C.	16.38	Pawtucket, R. I.	16.80	Wichita Falls	28.54
Atlanta, Ga.	24.98	Providence, R. I.	20.00		
Columbus, Ga.	21.13				
Macon, Ga.	26.40				
Birmingham, Ala.	14.40				
Montgomery, Ala.	10.05				
Knoxville, Tenn.	32.40				
Nashville, Tenn.	16.10				
Jackson, Miss.	29.11				
Meridian, Miss.	26.55				
Danville, Va.	13.50				
Average, S. E.	20.42	Average, N. E.	32.80	Average, West Texas	24.27

(27)

In Amarillo, for instance, the total tax rate per $1,000 in 1947, including city, school, county, and state taxes, was $42.80 but the estimated ratio of assessed value to true value was only 33 percent; the adjusted tax rate on 100 percent basis of assessment is therefore only $14.08.

In addition to the difficulty of comparing local tax rates, an analysis of the tax factor is incomplete unless it takes into consideration the amount and standards of governmental service offered by the city, county, and state. A manufacturing

(27) Bureau of Governmental Research, Detroit, "Tax Rates of American Cities," in **National Municipal Review**, (January, 1948).

enterprise requires adequate municipal facilities, such as utilities, water, police protection, road maintenance, and if these services are not satisfactorily filled, lower taxes are no savings. Many Southern mills were built in rural areas to avoid city taxes, but this policy made it necessary for mill owners to build their own communities, supplying among other things, housing, lighting, and recreational facilities which in other parts of the country were supplied by governmental agencies.

Some states have adopted a policy of granting tax exemptions to manufacturers as an inducement to relocation, and seven states offer tax concessions in their advertising. For instance, Mississippi grants a 5 year advalorem tax exemption to new industries and Louisiana grants a ten year tax exemption. Opinion is sharply divided on the over-all benefit to be derived by local communities, or by relocating industries, from such a policy. The Council of State Governments, for instance, states: "Sound, responsible industries locate on a basis of facts, and not solely because they are offered a few dollars' annual savings on taxes or free use of a factory building. Many states maintain that subsidies, tax concessions, and various other concessions are unsound in principle and often self-defeating. The main objective in an industrial development program is to provide greater economic opportunities which will result in over-all state benefits. If an industry cannot assume its portion of the tax burden, if it cannot provide its own plants, if it cannot pay decent wages, it will be a burden rather than a benefit to the state and community." (28)

Texas does have certain definite tax advantages to offer potential industries. The state has no corporate income tax, no sales tax, no state income tax, and a community property law which in effect reduces Federal income tax.

(28) Council of State Governments, **Advertising by the States.** Chicago, May, 1948) 7.

Conclusions

The study of each of the major requirements for textile manufacturing—capital, machinery and equipment, raw materials, labor, water, power and fuel, and transportation facilities—has indicated that the requirements are now available in West Texas, or that they can be made available economically. In some instances, such as supply of raw materials and potential labor supply, West Texas has a definite advantage over other sections of the country; in others, such as water supply and quality, power and fuel, West Texas can offer facilities at least equal to other sections of the country. In certain localities the quantity and/or quality of water is inadequate for large-scale industrial use; however this will have little bearing on the location of gray goods mills. The only locational factor which finds West Texas at a relative disadvantage is the cost of transportation to markets. This disadvantage long has been recognized, and determined and effective steps are being taken to overcome the present unfavorable position of West Texas in this respect.

It is true that transportation costs from West Texas mills to markets equidistant from Southeast competitors are greater, that transportation costs are higher on a mileage basis, and that West Texas products must travel greater distances to compete in the same markets with Southeastern mills. However, there are definite indications that West Texas mills can find adequate markets in localities to which this section would have a freight cost advantage over the Southeast, such as the West Coast and the Southwest.

This locational factor of accessibility to markets will have varying degrees of importance, depending upon the products to be manufactured. The survey indicates that the products best suited to West Texas manufacture are those made of cotton of 15/16" staple and shorter, and especially cotton of 7/8". Fabrics made of these staple lengths have a wide range of uses in industrial, apparel and household items. It appears that the most economical production of such goods is obtained in mills of at least 20,000 spindles, with 500 looms, employing about 500 persons. A new mill of this size would require capitalization of at least $2,500,000.

The best opportunity for new cotton mills, according to Lockwood Greene Engineers, is where the location of the mill would control a market for its products or where local interest might combine with existing companies to integrate the mill with a consuming industry, such as clothing manufacture of industrial fabrics. (29) The exact location of mills will be determined not only by the availability of textile manufacturing

(29) Lockwood Greene Engineers, Inc., "Cotton Textile Manufacturing in Missouri." Report for Missouri Department of Resources and Development. (1945).

requirements, but by effective factual presentation of local facilities by local groups. The Department of Commerce has pointed out that "There is a rather widespread misconception that obtaining new industry for a community or area merely means going out and persuading some industry that the area . . . is so desirable that the industry would have economic advantages there which would more than offset the cost of moving . . . In order that a city may offer adequate inducement for the creation of new industries or persuade outside industries to establish plants in the areas, such inducement must include well-analyzed facts showing that location within the area is economically advantageous for such industries." (30) A great many agencies in many states are presently engaged in gathering all available information concerning their areas' resources and potentialities and in bringing this information to the attention of potential investors. This work is being done by state and local development agencies and planning boards, local and regional chambers of commerce, state and local governments, and by railroads and private utility companies. The major themes used in advertising for industrial development are plant and site facilities, expanding markets, labor supply, raw materials, transportation facilities, and tax concessions. To provide a sound basis for negotiating with prospective investors or with relocating industry, a community should assemble indisputable facts concerning its resources. An industrial survey should be made for each community, showing (1) general information concerning the city, its population, and climate (2) available site locations, total acreage, acreage, suitable for construction, and estimated value per acre (3) Labor supply, quality and cost (4) Developed and undeveloped water power resources and water analyses (5) electric power supplies, nearest electric power line, amount and cost of power (6) quality and cost of fuel, extent of fuel supply, means of bringing fuel from its source (7) transportation facilities, railroads, highways, motor freight, airlines.

(30) U. S. Department of Commerce, **Basic Industrial Location Factors.** (Rev. June, 1947) 17 ff.

Appendix

Table I

SPINDLES IN PLACE IN COTTON MILLS BY SECTIONS AND BY STATES

Selected Years, 1900 - 1948

	1900 (Thousands)	1920 (Thousands)	1923 (Thousands)	1927 (Thousands)	1929 (Thousands)	1939 (Thousands)	1942 (Thousands)	1945 (Thousands)	1946 (Thousands)	1948 (Thousands)
Cotton Growing	4,368	15,266	16,458	18,169	18,848	18,319	17,936	17,607	18,128	18,335
New England	13,171	18,543	18,931	16,871	14,549	6,143	5,334	4,931	5,125	4,931
All Other	1,933	2,025	2,020	1,656	1,423	799	698	590	609	513
United States	19,472	35,834	37,409	36,696	34,820	25,261	23,968	23,128	23,862	23,779
Alabama	411	1,215	1,330	1,523	1,805	1,811	1,835	1,804	1,819	1,812
Connecticut	1,064	1,393	1,367	1,167	1,105	520	522	486	501	486
Georgia	816	2,542	2,694	2,969	3,125	3,234	3,142	3,064	3,177	3,216
Maine	848	1,127	1,141	1,118	1,059	689	621	602	602	648
Massachusetts	7,933	11,759	11,951	10,542	8,587	3,434	2,946	2,694	2,789	2,701
Mississippi	75	175	179	176	177	165	138	133	*	123
New Hampshire	1,250	1,444	1,450	1,430	1,391	429	296	*	*	*
New Jersey	432	418	447	378	381	142	144	115	*	*
New York	764	998	1,037	873	688	347	320	268	288	269
North Carolina	1,133	4,955	5,509	6,199	6,223	5,866	5,818	5,719	5,848	5,916
Pennsylvania	337	260	203	120	98	94	64	62	*	*
Rhodelsland	1,976	2,676	2,877	2,469	2,290	973	914	825	862	753
South Carolina	1,431	4,974	5,132	5,403	5,586	5,619	5,412	5,314	5,522	5,640
Tennessee	124	400	439	588	617	550	544	533	562	556
Texas	49	145	176	269	282	239	243	240	242	239
Virginia	127	576	673	711	709	639	636	621	646	648
All Other States	702	777	804	761	697	510	373	648	1,004	772

* Included in "All Other States"

Source: Bureau of the Census.

Table II
COTTON MILLS IN TEXAS — 1948

NAME	City	Capital	Products Manufactured	No. of Spindles	Power	No. of Employees	Means of Sale	Buy
Bonham Cotton Mills	Bonham	$400,000	Narrow cotton sheetings and drills	16,000	Steam and Electric	375	Direct	8,000 Bales 15/16 in. & S. L. M.
Brenham Cotton Mills, Inc.	Brenham	150,000	Drills, sheetings, bag goods and toweling	7,128	Electric	200	Direct	
Corsicana Cotton Mills	Corsicana	500,000	Single and double filling ducks, also osnaburgs	13,260	Electric	525	Wm. L. Barrell, Inc. New York	
Guadalupe Valley Cotton Mills	Cuero	400,000	Ducks, single and double fillings, osnaburgs	8,280	Electric	330	Southeastern Cotton, Inc., N. P.	
Texas Textile Mills, Inc. (Love Field, McKinney, Waco)	Dallas	143,800	Work denims, awnings, novelties, whipcords, chambray, tickings, drills, etc.	15,504	Electric	450	Hesslein & Co., N. Y.	
Denison Cotton Mill Company	Denison	700,000	Single, double filled cotton duck	16,308	Steam	230	Direct	8,000 bales 7/8" to 1" M & S. M.
Lone Star Cotton Mills	El Paso	412,000	Drills, sheetings, duck	9,544	Electric	300	Direct	5,000 bales 15/16" to 1" M & S. M.
Fort Worth Cotton Mills	Fort Worth		Class C sheetings, broad cloth, printcloth, shirtings	*23,000	Buy Electric	650	New York Office, 991 Ave. of Americas	

*This figure, based on recent unpublished report, includes 7,000 spindles not reported in published data.

Table II—Continued
COTTON MILLS IN TEXAS — 1948

NAME	City	Capital	Products Manufactured	No. of Spindles	Power	No. of Employees	Means of Sale	Buy
Gonzales Cotton Mill	Gonzales		Ducks, drills and osnaburgs	6,796	Electric		Direct	7,000 bales 15/16"
Lov-Knit Mfg. Co., Inc.	Greenville	40,000	Cotton yarns, polo shirts, athletic underwear, knitted cloth	2,000		125	Chains and retailers	
Hillsboro Cotton Mills	Hillsboro	200,000	All weights single filling duck, osnaburgs	6,600	Electric	275	Direct and Southern Textile Com. Co., N. Y.	
Houston Cotton Mills Co.	Houston	125,000	Twines, mop yarn 1st to 16s	5,776		310	Direct and agents	15,000 bales
Houston Textile Co., Inc.	Houston	350,000	Cotton blankets, laundry felts, interlining cloth bathrobing	7,296	Electric	400	Cone Export and Com. Co., N. Y.	8,000 bales
Itasca Cotton Mfg. Co.	Itasca	357,000	Ducks and specialties	10,048	Electric	275	Agents	10,000 bales 15/16" to 1"
Itasca Yarn Mill, Inc.	Itasca	60,000	Twines, mop yarns, rug yarns, sales yarns	2,800	Electric	150	Direct and Agents	2,700 bales 15/16" L. M.
Texas Textile Mills, Inc. (Branch of Dallas)	McKinney		Colored fabrics for work clothing	16,604				
Mexia Textile Mills	Mexia	450,000	Flat duck, osnaburgs, drills	7,944	Electric	225	Direct and T.A. Shaw & Co., Chicago	9,000 bales 15/16", 31/32" S. F. O. to M.

Table II—Continued
COTTON MILLS IN TEXAS — 1948

NAME	City	Capital	Products Manufactured	No. of Spindles	Power	No. of Employees	Means of Sale	Buy
New Braunfels Textile Mills, Inc.	New Braunfels	160,000	Ginghams, dress goods draperies, colored cotton goods	26,000		700	Iselin-Jefferson, New York	8,000 bales 1 1/16" S. M.
Postex Cotton Mills	Post	457,000	Wide sheetings, sheets pillow cases	11,520	Steam and Electric	280	Leslie and Co., New York	
Sherman Mfg. Co.	Sherman	100,000	7 to 16 oz. duck, single filling	10,024	Electric	210	Direct	10,000 bales 7/8" to 15/16" M. and better
San Antonio Cotton Mills	Southton	500,000	Duck, osnaburgs, upholstery	4,228	Electric	150	T. A. Shaw & Co., Chicago	4,000 bales 15/16" L. M. and M.
Southwestern Cotton Mills (Closed)	Waco			3,566	Electric			
Texas Textile Mills (Branch of Dallas)	Waco		Colored fabrics for work clothing	10,000				
West Mills, Inc.	West	200,000	Single filling duck osnaburgs	6,240	Electric	290	H. T. Hunter Co., Chicago; and Direct	

Sources: Official Statistics Section, American Wool and Cotton Reporter
Davison Textile Blue Book
Local Mill Managements.

Table III
DISTRIBUTION OF COTTON PRODUCTION, SPINDLES IN PLACE, AND POPULATION

	Bales of Cotton 1947 Crop	Cotton System Spindles in Place, June 30, 1948	Estimated Population 1947
		(Thousands)	(Thousands)
NEW ENGLAND			
Maine		648	911
New Hampshire		392*	547
Vermont		35*	364
Massachusetts		2,701	4,725
Rhode Island		753	761
Connecticut		486	2.020
MIDDLE ATLANTIC			
New York		269	14,092
New Jersey		118*	4,435
Pennslyvania		60*	10.281
EAST NORTH CENTRAL			
Ohio		5*	7.773
Indiana		54	3,858
Illinois		29*	8,221
Michigan		5*	6,249
WEST NORTH CENTRAL			
Missouri	314,613		3,854
SOUTH ATLANTIC			
Maryland		57*	2,215
Virginia	14,579	648	3.019
North Carolina	457,191	5,916	3,718
South Carolina	640,005	5,640	1,918
Georgia	647,224	3,216	3,233
Florida	6,017		2,394
EAST SOUTH CENTRAL			
Kentucky		23*	2,777
Tennessee	506,343	556	3,079
Alabama	908,256	1,812	2,824
Mississippi	1,515,333	123	2,092
WEST SOUTH CENTRAL			
Arkansas	1,245,458	48*	1,903
Louisiana	489,466	59*	2,549
Oklahoma	317,581	44*	2,311
Texas	3,305,840	239	7,118
MOUNTAIN			
Arizona	235,368		657
New Mexico	169,527		550
PACIFIC			
California	765,830	16*	9.876

Sources: USDA, Bureau of Census, Davison's Textile Blue Book.
*States not listed separately in census reports; estimates from Textile Blue Book.

Table IV

ESTIMATED GRADE AND STAPLE LENGTH OF UPLAND COTTON GINNED IN TEXAS, CROP OF 1947

	3/16" & Shorter Bales	Per Cent	7/8" Bales	Per Cent	15/16" (Incl. 29/32")	Per Cent	1" (Incl. 31/32") Bales	Per Cent	1-1/16" (Inc. 1-1/32") Bales	Per Cent	1⅛" & longer (Inc. 1-3/32") Bales	Per Cent	All Length Bales	Per Cent
Middling Fair														
Strict Good Mid.					1,140	*	680	*	10	*	10	*	1,840	.1
Good Middling	22,660	.7	38,790	1.2	83,100	2.5	39,020	1.2	18,320	.6	20,300	.6	222,190	6.7
Strict Middling	147,810	4.5	170,780	5.1	355,100	10.7	176,260	5.3	156,130	4.7	63,220	1.9	1,069,300	32.3
Middling	229,120	6.9	187,610	5.7	340,850	10.3	180,040	5.4	98,980	3.0	19,050	.6	1,055,650	31.9
Strict Low Mid.	132,350	4.0	101,330	3.1	107,760	3.3	82,860	2.5	82,300	2.5	3,390	.1	509,990	15.4
Low Middling	94,630	2.9	66,660	2.0	71,480	2.2	35,610	1.1	25,630	.8	290	*	294,300	8.9
Strict G. Ordin.	27,130	.8	21,030	.6	20,950	.6	11,640	.4	3,880	.1		*	84,630	2.6
Good Ordinary	5,040	.1	2,360	.1	1,480	*	550	*	100	*	10	*	9,540	.3
Miscellaneous (1)	33,280	1.0	14,970	.5	6,510	.2	1,890	.1	1,660	*	90	*	58,400	1.8
All Grades	692,020	20.9	603,530	18.3	988,370	29.8	528,550	16.0	387,010	11.7	106,360	3.2	3,305,840	100.0

(1) Includes all grades, tinged, stained and gray, and below grade cotton.

* Less than .05 percent.

Source: United States Quality Report for Ginnings, 1947 Crop. U. S. Department of Agriculture, March 23, 1948.

Table V — END USE MARKETS FOR COTTON

TYPICAL GRADE AND STAPLE LENGTH OF COTTON	DESCRIPTION OF MATERIAL	END USE	BALES, TEXAS 1947 CROP
7/8" Middling	Duck	Awnings, tents and tarpaulins	187,610
7/8" Low Middling	Chenille, tufted	Bath mat sets	66,660
	Huck, crash	Dish Cloths	
	Sheeting	Sugar bags	
	Laundry Net	Laundry Nets	
15/16" Middling	Sheeting	Men's rainwear, oiled garments	206,420
	Chambray, hickory stripes	Women's slack suits	
	Duck	Fire Hose	
	Gauze	Medical supplies	
15/16" S. Low Middling	Hickory stripe, twill	Men's coveralls	61,520
	Covert, cottonade	Work trousers	
	Birdseye	Diapers	
	Duck	Conveyor belts	
	Duck	Hose, except fire	
	Sheeting	Laundry press materials	
	Print cloth	Luggage lining	
15/16" Low Middling	Gabardine, twill	Men's ski pants	38,310
	Corduroy, gabardine	Women's coats and jackets	
1" Middling	Broadcloth, flannel	Men's pajamas	77,420
	Chambray	Work shirts	
	Poplin, seersucker	Dress trousers	
	Dimity, print	Children's dresses	
	Corduroy	Children's skirts, suits	
	Regular bed ticking, Jacquard	Bed ticking	
	Marquisette, organdy	Curtains	
	Huck, damask	Towels and Toweling	
1" Strict L. Middling	Flannel, terrycloth	Women's bathrobes	51,770
	Cretonne, damask	Draperies	
	Jacquard tapestry	Household upholstery	
1" Low Middling	Seersucker, pique	Women's suits, skirts	24,470

Source: National Cotton Council, printed in STUDY OF AGRICULTURE.
United States Quality Report for Ginnings, 1947 Crop, U. S. Dept. of Agriculture, March 23, 1948.

Table VI
SOME LAKES AND DAMS IN WEST TEXAS

Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Archer	Little Wichita	City of Wichita Falls	50 ft. dam; 5,700 acre lake; 100,000 acre ft. storage	Irrigation, Municipal	Proposed, Surveys and estimates made, 1945
Baylor	Wichita	Lake Kemp	100 ft. dam; 22,827 acre lake; 600,000 ft. storage	Irrigation, Municipal, Industrial	Wichita County Water Imp. Dist. No. 1
Baylor-Archer Wichita	Wichita	Lake Kemp	50 ft. dam; 16,000 acre lake; 40,000 acre ft. storage	Irrigation, Municipal, Industrial	Wichita County Water Imp. Dist. No. 1
Bosque-Johnson Hood-Somervell	Brazos	Bee Mountain	100 ft. dam; 7,000 acre lake; 230,000 acre ft. storage	Irrigation, Flood Control	Proposed, Survey made
Bosque-Hill	Brazos	Whitney	80 ft. dam; 5,000 acre lake; 100,000 acre ft. storage	Irrigation, Flood Control	Proposed, Survey made. Congress authorized construction by Corps of Engineers (1946
Brown	Pecan Bayou (Branch of Colorado)	Brownwood	125 ft. dam; 4,500 acre lake; 125,000 acre ft. storage	Municipal, Irrigation, Flood Control	Plans for raising dam to provide additional storage (1946)
Burnet	Colorado	Inks	17,100	Power	
Burnet-Llano	Colorado	Buchanan	137 ft. dam; 23,240 acre lake; 1,000,000 acre ft. storage	Flood Control, Power, Irrigation, Water Supply	Part constructed

Table VI—Continued
SOME LAKES AND DAMS IN WEST TEXAS
Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Burnet-Llano	Colorado	Inks	45 ft. dam; 1,850 acre lake; 28,750 acre ft. storage	Flood control, Power, irrigation	State permit granted
Burnet	Colorado		70 ft. dam; 1,200 acre lake; 23,646 acre ft. storage	Flood control, Power, Irrigation	State permit granted
Coke	Colorado	Robert Lee		Municipal supply, Irrigation	Upper Colorado River Authority cooperating with Bureau of Reclamation in construction, 1946
Coke-Runnels	Colorado	Bronte	100 ft. dam; 46,080 acre lake; 750,000 acre ft. storage	Municipal Irrigation	Proposed, surveys made, Prelim. filing
Coleman	Hords Creek	Coleman			Congress authorized and appropriated funds for construction under supv. Corps of Eng., 1946
Denison-Cooke & Oklahoma	Red River	Denison	165 ft. dam; 250,000 acre lake; 12,750,000 acre ft. storage	Flood control, Power, Navigation	
Coryell-Bell	Leon	Leon-Belton	115 ft. dam; 10,300 acre lake; 340,000 acre ft. storage	Irrigation, Flood control Power, Municipal Recreation	Proposed, survey
Dalham	Rita Blanca Creek	Rita Blanca	12,100 acre ft. capacity		

Table VI—Continued

SOME LAKES AND DAMS IN WEST TEXAS

Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Deaf Smith	Tierra Blanco Creek	Umbarger	18,150 acre ft. when constructed	Recreation	
Denton	Elm Creek	Lake Dallas	65 ft. dam; 11,000 acre lake; 214,000 acre ft. storage	Municipal	City of Dallas
Eastland	Sandy Creek	Lake Cisco	118.5 ft. dam; 1,000 acre lake; 45,000 acre ft. storage	Irrigation, Municipal	
Eastland	Leon River	Lake Belsford	35 ft. dam; 200 acre lake; 4,900 acre ft. storage	Industrial	
Foard-Hardeman	Pease River	Pease Project	92 ft. dam; 11,000 acre lake; 350,000 acre ft. storage	Irrigation, 60,000 acre flood control	Proposed surveys and estimates made
Hardeman	Wanderers Creek	Lake Pauline	60 ft. dam; 345 acre lake; 7,000 acre ft. storage	Industrial, 1928	
Hood-Parker	Brazos	Cordova Bend	85 ft. dam; 8,300 acre lake; 127,000 acre ft. storage	Irrigation, Flood Control, Municipal	Proposed, survey made
Jones	Elm Creek	Phantom Hill	74,000 acre ft. storage	Flood Control, Municipal	Proposed, survey made 1943
Kimble	South Llano	South Llano	110 ft. dam; 2,500 acre lake; 1,000,000 acre ft. storage	Irrigation, Flood control,	Proposed, surveys made, preliminary filing
Lampasas-San Saba	Colorado	Bronte	137 ft. dam; 26,500 acre lake; 769,000 acre ft. storage	Flood Control, Power, Irrigation	Proposed survey made

Table VI—Continued
SOME LAKES AND DAMS IN WEST TEXAS
Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
McLennan	N. Bosque	Lake Waco	50 ft. dam; 1,850 acre lake; 30,000 acre ft. storage	Municipal	City of Waco
Mitchell	Colorado		6 mi. above Colorado City	Flood Control, Municipal, Industrial	Five W. Texas cities planning joint water supply project, in construction of reservoir, 1946.
Nolan	Bitter Creek	Sweetwater	78 ft. dam; 405 acre lake; 10,000 acre ft. storage	Municipal	City of Sweetwater
Oldham	Canadian		500,000 acre ft. storage capacity	Irrigation, 100,000 acres Flood control	Dam sites examined and geological investigattion made, proposed project.
Palo Pinto-Stephens-Young	Brazos	Possum Kingdom	125 ft. dam; 21,300 acre lake; 750,000 acre ft. storage	Irrigation, Flood control, Power, Municipal	
Palo Pinto	Brazos	Little Keechie	45 ft. dam; 2,100 acre lake; 30,000 acre ft. storage	Irrigation, Flood control, Power, Municipal	Proposed, survey made
Palo Pinto	Brazos	Inspiration Point	90 ft. dam; 10,800 acre lake; 300,000 acre ft. storage	Irrigation, Flood control, Power, Municipal	Proposed, survey made
Parker	Rock Creek	Mineral Wells	68.5 ft. dam; 1,000 acre lake; 7,300 acre ft. storage	Municipal	

Table VI—Continued
SOME LAKES AND DAMS IN WEST TEXAS
Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Potter	Canadian		500,000 acre ft. storage capacity	Irrigation of about 100,000 acres, Flood control	Dam site examined and geological investigation made, proposed project
Presidio	Alamita Creek	San Estaban	80 ft. dam; 762 acre lake; 18,770 acre ft. storage	Irrigation of 8,500 acres	
Reeves	Toyah Creek	Balmorhea	50 ft. dam; 530 acre lake; 5,165 acre ft. storage	Irrigation of 12,500 acres	
Reeves-Loving	Pecos River	Red Bluff	112 ft dam; 11,500 acre lake; 285,000 acre ft. storage	Irrigation of 100,000 acres, Flood control, Power	Dist. organized, contract let, Federal aid granted
San Saba	San Saba	San Saba	110 ft. dam; 1,725 acre lake; 57,000 acre ft. storage	Irrigation, Flood control	Proposed, surveys made, 40,000 acres irrigated
Stonewall-Haskell	Salt Fork	Seymour	61 ft. dam; 12,000 acre lake; 300,000 acre ft. storage	Irrigation, Flood Control, Power, Municipal	Proposed, survey made
Tarrant-Denton	Denton Creek	Grapevine	105 ft. dam; 8,650 acre lake; 310,000 acre ft. storage		Trinity River Reclamation Study, Vol I, Part II.
Tarrant-Wise	W. Fork Trinity	Eagle Mountain	60 ft. dam; 9,500 acre lake; 210,000-420,000 acre ft. storage	Municipal Flood control, Irrigation, 1931	Tarrant County Water Control & Imp. Dist. No. 1

Table VI—Continued
SOME LAKES AND DAMS IN WEST TEXAS
Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Tarrant	W. Fork Trinity	Lake Worth	3,720 acre lake; 27,000 acre ft. storage capacity	Municipal, City of Ft. Worth	
Tarrant	Clear Fork		125 ft. dam; 10,000 acre lake; 380,000 acre ft. storage	Municipal, Flood control	Proposed, surveys made
Tarrant	W. Fork Trinity	Grand Prairie Mountain Creek	95 ft. dam; 8,800 acre lake; 124,000 acre ft. storage	Industrial	Trinity River Reclamation Study; Williams, Meyers & Powell, Vol I, Part II.
Taylor	Elm Creek	Lake Abilene	80 ft. dam; 20,000 acre ft. storage	Municipal	City of Abilene
Taylor	Lytle Creek	Lytle Creek	32 ft. dam; 6,500 acre ft. storage	Industrial	West Texas Utilities
Taylor	Cedar Creek	Lake Kirby	50 ft. dam; 700 acre lake, 8,500 acre ft. storage	Municipal, 1928	
Throckmorton	Clear Fork	Breckenridge	115 ft. dam; 12,900 acre lake; 460,000 acre ft. storage	Irrigation, Flood control, Power, Municipal	Proposed; survey made
Tom Green	S. Concho River	Nasworthy	45 ft. dam; 2,000 acre lake; 10,500 acre ft. storage	Municipal, Industrial, Irrigation,	
Tom Green	N. Concho River	San Angelo		Irrigation Municipal, Industrial, Flood control	Congress authorized Corp. of Engineers to investigate and to construct, 1946.

Table VI—Continued

SOME LAKES AND DAMS IN WEST TEXAS

Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Tom Green	Concho River	Nasworthy	86 ft. dam; 10,000 acre lake; 200,000 acre ft. storage	Irrigation	State permit granted for increase in height, 25,000 acres to be irrigated.
Travis	Colorado	Lake Austin	66 ft. dam; 1,500 acre ft. storage	Power, Municipal	
Travis	Colorado	Lake Travis (Marshall Ford)	1,950,000 acre ft. storage	Flood control, Power, Irrigation, Water supply	
Travis	Colorado		75 ft. dam; 4,800 acre lake; 196,000 acre ft. storage	Flood control, Power, Irrigation	State permit granted
Travis-Burnet	Colorado		125 ft. dam; 14,700 acre lake; 718,000 acre ft. storage	Flood control, Power, Irrigation	State permit granted
Travis	Onion Creek	McKinney Falls	75 ft. dam; 2,875 acre lake; 46,875 acre ft. storage	Irrigation, Flood Control	
Val Verde	Devils River		37 ft. dam; 460 acre lake; 8,460 acre ft. storage		Proposed State permit granted
Val Verde	Devils River		98 ft. dam; 45,700 acre ft. storage		Proposed state permit granted

Table VI—Continued
SOME LAKES AND DAMS IN WEST TEXAS
Existing and Proposed

COUNTY	RIVER	NAME	SIZE	USES	COMMENTS
Val Verde	Devils River		34 ft. dam; 250 acre lake; 3,500 acre ft. storage	Power	Central Power & Light Co.
Val Verde	Devils River		40 ft. dam; 440 acre lake; 10,750 acre ft. storage	Power	Central Power & Light Co.
Val Verde	Pecos River	Pecos River Project		Power	Proposed tunnel from dam to Rio Grande River
Wichita-Archer	Holliday Creek	Lake Wichita	36 ft. dam; 2,050 acre lake; 13,500 acre ft. storage	Municipal	
Wise	W. Fork Trinity	Bridgeport	110 ft. dam; 9,600 acre lake; 290,000/580,000 acre ft. storage	Municipal, Flood control	Tarrant County Water Control & Imp. District No. 1.
Young	Flint Creek	Lake Graham	35 ft. dam; 290 acre lake; 4,500 acre ft. storage	Municipal	

Sources: Official Map of Lakes and Dams of Texas, 1934
Texas Looks Ahead, 1944
Progress, Texas Board of Water Engineers, 1946

Table VII

COMPARATIVE FREIGHT RATES
(RATES ARE IN CENTS PER 100 POUNDS ANY QUANTITY)

W. B. Langford, Texas Engineering Experiment Station, A. & M. College

From	To	Short Line Miles	Percent of Mileage	Actual Rates	Rates Based on Mileage	Results when rates are based on mileage: Decrease	Results when rates are based on mileage: Increase	Tariff References
COTTON PIECE GOODS FINISHED								
Sweetwater, Texas	Chicago, Illinois	1060.8	38	170	192		22	Southwestern Lines Tariff No. 11-C-
Atlanta, Ga.	Chicago, Illinois	740.0	27	163	137	26		D. Q. Marsh's ICC No. 3769
Boston, Mass.	Chicago, Illinois	972.0	35	173	177		4	Southern Freight Tariff Bureau—Tariff No. 733-C—Hoke's ICC No. 89
TOTAL		2772.8	100	506	506	26	26	Trunk Line Tariff Bureau—Tariff No. 60-A W. S. Curlett's ICC No. A-766
Sweetwater, Texas	Denver, Colorado	680.6	17.1	175	142	33		Southwestern Lines Tariff No. 61-E-
Atlanta, Ga.	Denver, Colorado	1332.0	33.4	273	278		5	D. Q. Marsh's ICC No. 3552
Boston, Mass.	Denver, Colorado	1977.0	49.5	384	412		28	Western Trunk Line Tariff No. 385- L. E. Kipp's ICC No. A-3020
TOTAL		3989.6	100.0	832	832	33	33	Trunk Line Tariff Bureau—Tariff No. 107-C W. S. Curlett's ICC No. A-767
COTTON PIECE GOODS UNFINISHED								
Sweetwater, Texas	Chicago, Illinois	1060.8	38	154	173		19	Southwestern Lines Tariff No. 11-C
Atlanta, Ga.	Chicago, Illinois	740.0	27	145	123	22		D. Q. Marsh's ICC No. 3769
Boston, Mass.	Chicago, Illinois	972.0	35	156	159		3	Illinois Frt. Tariff Bur.—Tariff No. 15-E R. G. Raaschs ICC No. 485
TOTAL		2772.8	100	455	455	22	22	Trunk Line Tariff Bureau—Tariff No. 60-A W. S. Curlett's ICC No. A-766
Sweetwater, Texas	Denver, Colorado	680.6	17.1	158	129	29		Southwestern Line Tariff No. 61-E-
Atlanta, Ga.	Denver, Colorado	1332.0	33.4	346	351		5	D. Q. Marsh's ICC No. 3552
Boston, Mass.	Denver, Colorado	1977.0	49.5	348	372		24	Western Trunk Line Tariff No. 385 L. E. Kipp's ICC No. A-3020
TOTAL		3989.6	100.0	752	752	29	29	Trunk Line Tariff Bureau—Tariff No. 107-C W. S. Curlett's ICC No. A-767
COTTON PIECE GOODS —— FINISHED AND UNFINISHED								
Sweetwater, Texas	San Francisco, Calif.	1628	15.3	238	177	61		Trans-Continental Freight Bureau—Tariff
Boston, Mass.	San Francisco, Calif.	3219	30.3	315	349		34	No. 1-Z—L. E. Kipp's ICC No. 1524
New York, N. Y.	San Francisco, Calif.	3116	29.4	315	339		24	Trans-Continental Freight Bureau—Tariff No. 1-Z—L. E. Kipp's ICC No. 1524
Atlanta, Ga.	San Francisco, Calif.	2644	25.0	285	288		3	Trans-Continental Freight Bureau—Tariff No. 1-Z—L. E. Kipp's ICC No. 1524
TOTAL		10607	100.0	1153	1153	61	61	Trans-Continental Freight Bureau—Tariff No. 1-Z—L. E. Kipp's ICC No. 1524

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