BUREAU OF ECONOMIC GEOLOGY

Geological Circular 65-4

Texas Minerals: Trends in Production

By

W. L. FISHER

The University of Texas

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INTRODUCTION

Minerals play a vital role in the economy of an industrial State. In Texas, where annual production of minerals currently amounts to more than $4.5 billion--twice the value of agricultural products, equal the value of manufactured products, and equal to half the value of all retail trade--mineral production is the principal part of the State's economic foundation. Analyses of past production trends and economic factors allow predictions of future trends in this vital and important segment of the Texas economy.

Included herein are production graphs and brief annotations of production trends of principal or representative Texas mineral commodities. Period considered is 1950 through 1964, a period embracing significant post-war developments in the State and National economy. Graphs presented show the ratio of specified value or quantity of a commodity for designated years to the value or quantity for 1950 or earliest year since 1950 for which data are available (i.e., base 1950 = 100). All values are in current dollars unless otherwise noted. Supplementary charts are as indicated. References are listed under Sources of Data.

Chart 1. GROSS NATIONAL PRODUCT AND MINERAL PRODUCTION

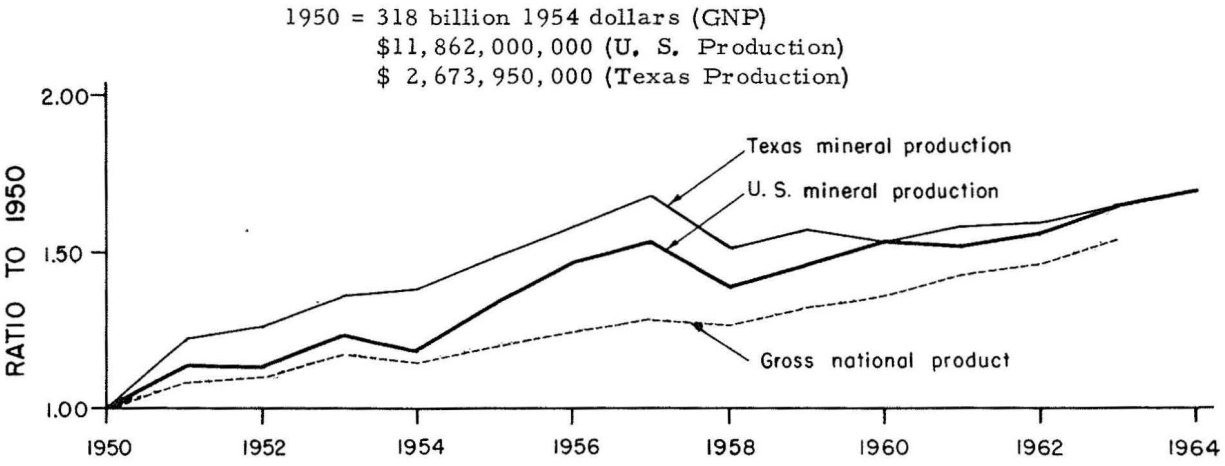


Chart 2. MINERAL PRODUCTION IN CONSTANT 1957-1959 DOLLARS

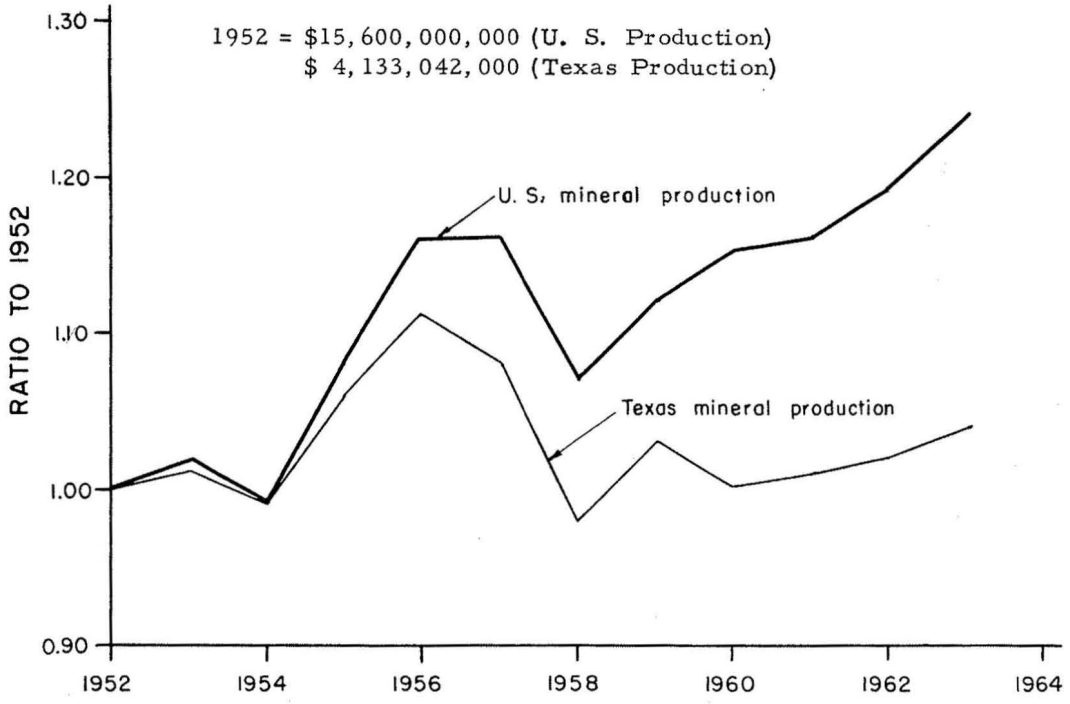
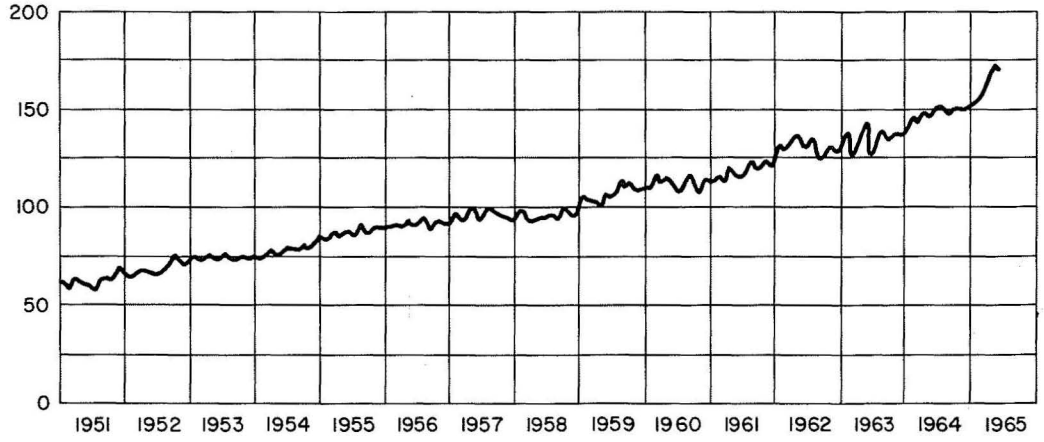


Chart 3. TEXAS BUSINESS ACTIVITY

(Index, adjusted for seasonal variation, 1957-1959=100)



MINERAL FUELS

Texas leads the Nation in the production of crude oil, natural gas, and natural gas liquids. Value of production of these mineral fuels accounts for 92 percent of the current total Texas mineral production and accounts for Texas' large share (22 percent) of the total National mineral output.

Not only is production of mineral fuels vital to the State's economy in a direct sense but the availability of these minerals is an important attraction to industries processing them as raw materials and to industries utilizing them as fuels. The Nation's greatest concentration of petrochemical capacity and production is located on the Texas Gulf Coast.

Chart 4. PRODUCTION OF MINERAL FUELS

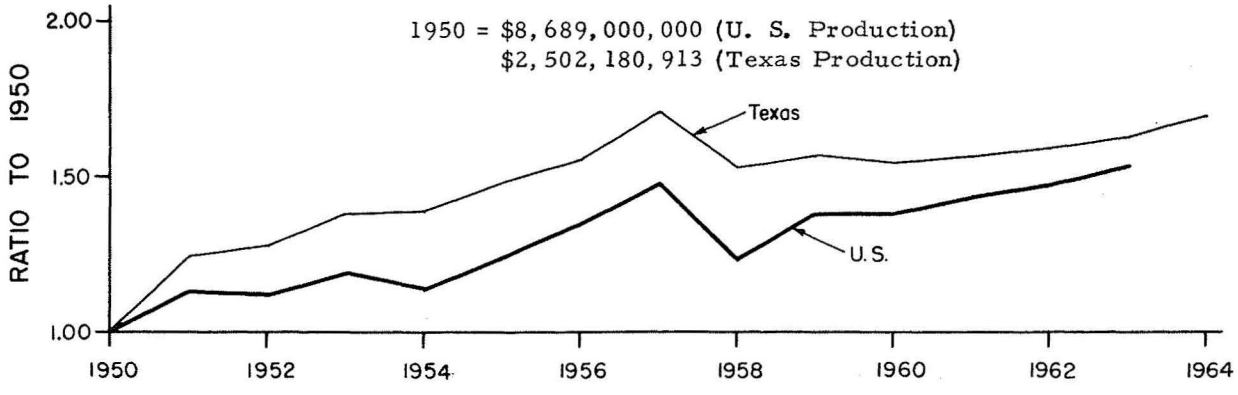
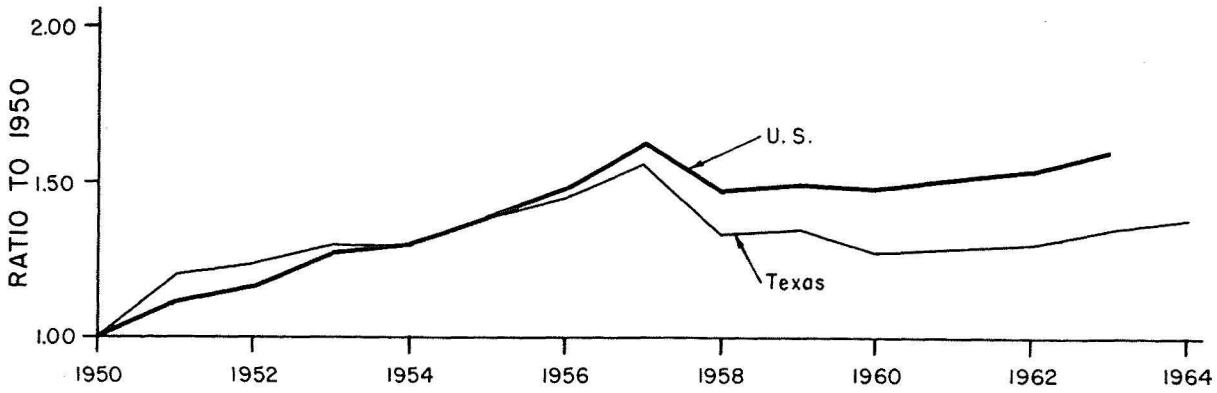


Chart 5. PRODUCTION OF CRUDE OIL

1950 = $4, 963, 380, 000 (U. S. Production)
$2, 147, 160, 000 (Texas Production)



Crude Oil

Production of crude oil in Texas during 1950 through 1957 followed the post-war pattern of steady increase with rising national demand. Production declined sharply in 1958 with a general decrease through 1960. Since 1960 volume of production has been slightly rising but below peak production of the middle 1950's; total value of crude production since 1960 likewise has been slightly rising, but due to oversupply and resultant lower prices, upward trend in value has been less than that of volume. In 1950 the value of crude oil was 80 percent of the total Texas mineral production; currently, it is a little more than 60 percent.

Decline in Texas crude oil production has resulted from competition by natural gas as a fuel source, and from a slight decrease in the growth rate of domestic demand, but more significantly, from increased imports and decreased exports. Volume of imports rose rapidly while exports decreased from 1950 through 1957; since 1958 a series of Federal import quotas have reduced these trends. Finally, a relatively rapid increase in the rate of crude oil production in other States (chiefly California, Louisiana, and Oklahoma) is a factor in the decline of Texas production.

Chart 6. PRODUCTION OF CRUDE OIL, TEXAS AND OTHER STATES

1950 = 1,143,700,000 bbls. (Other States)
829,900,000 bbls. (Texas)

Chart 7. U. S. IMPORTS AND EXPORTS OF CRUDE OIL

1950 = 177,700,000 bbls. (imports)
34,800,000 bbls. (exports)

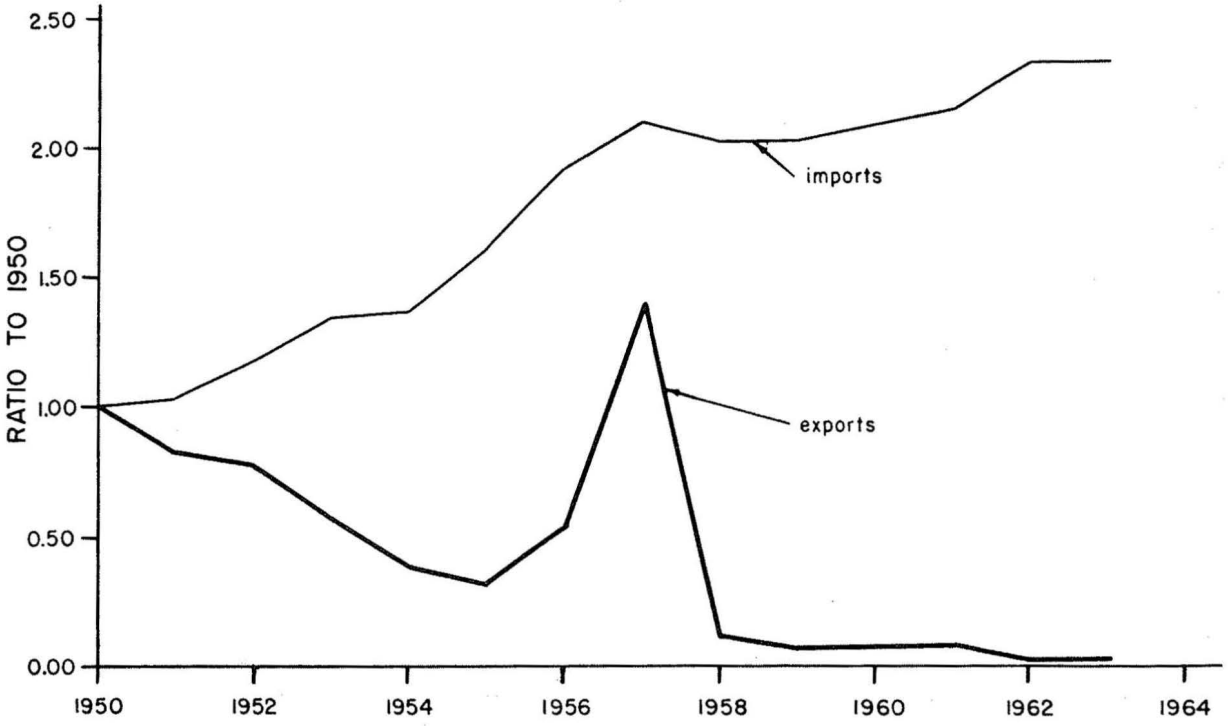
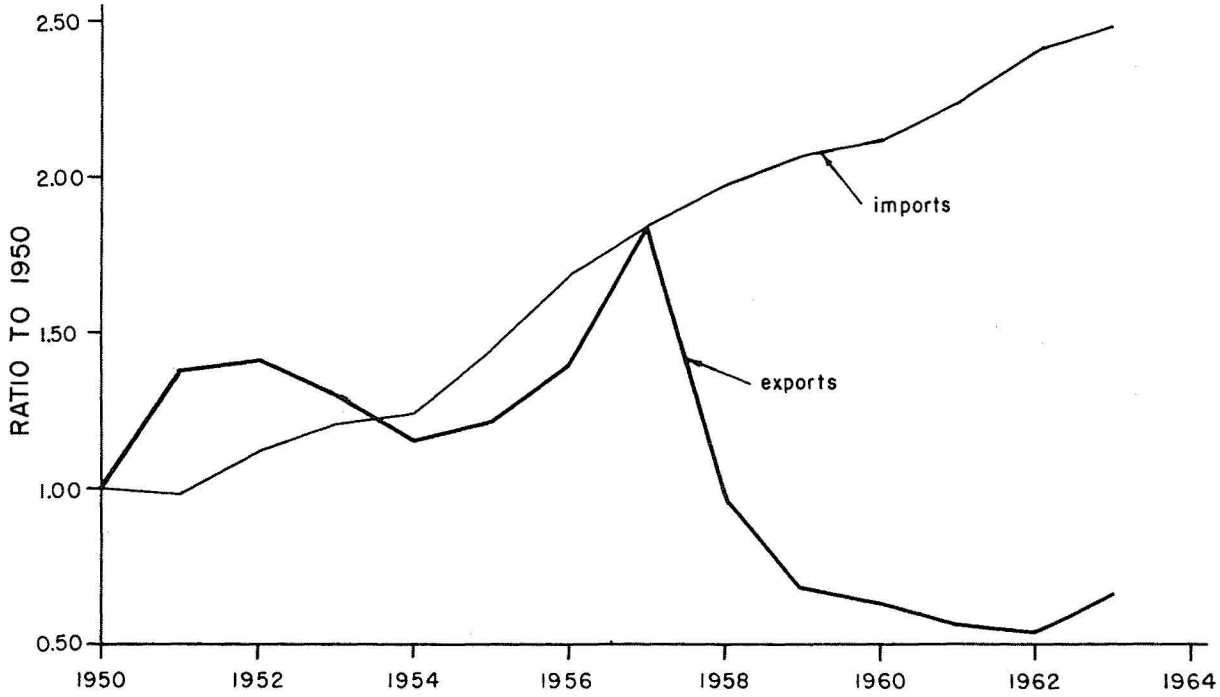


Chart 8. U. S. IMPORTS AND EXPORTS OF CRUDE OIL AND REFINED PRODUCTS

1950 = 310,200,000 bbls. (imports)
111,300,000 bbls. (exports)



Natural Gas

Production of natural gas has increased steadily during the post-war years. In 1960 natural gas accounted for about 6 percent of the total value of mineral fuels produced in Texas; currently, it accounts for approximately 20 percent. Volume of production has advanced at a rate below that of value. Since 1960 annual rate of increase in production has declined slightly, largely due to oversupply. During 1940 to 1950 natural gas production in Texas increased at an average annual rate of 11.4 percent; during 1950 to 1960 increase was 6.5 percent. Since 1960, the average annual rate of increase has been about 3 percent.

Approximately 50 percent of the total Texas production of natural gas is consumed outside the State. Consumption within the State is closely tied to industrial development as natural gas is used chiefly as an industrial fuel, for oil-field use, and in refineries. Consumption for all uses except for the manufacture of carbon black has increased steadily in recent years and will continue to increase as industrialization develops.

Chart 9. PRODUCTION OF NATURAL GAS

1950 = $146,941,000
3,126,402 m. c. f.

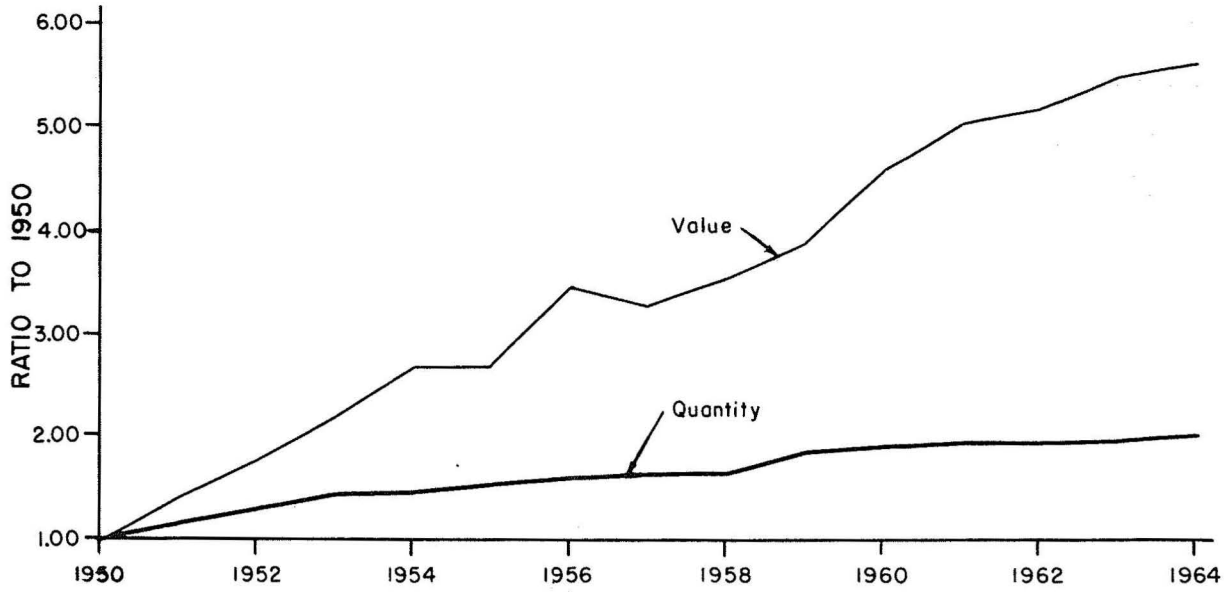
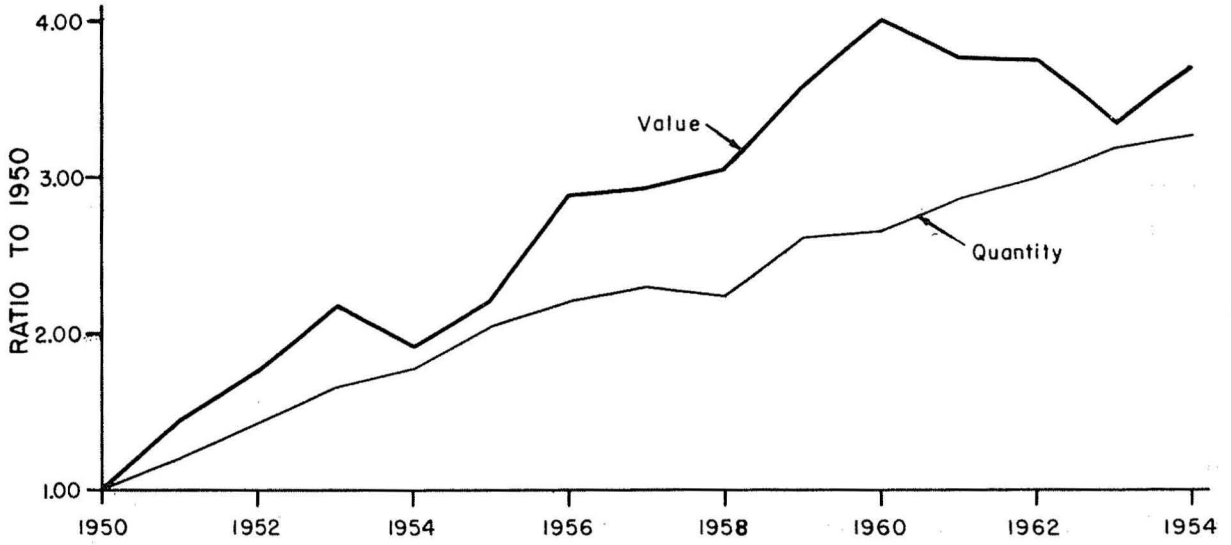


Chart 10. PRODUCTION OF NATURAL GAS LIQUIDS (LP GAS)

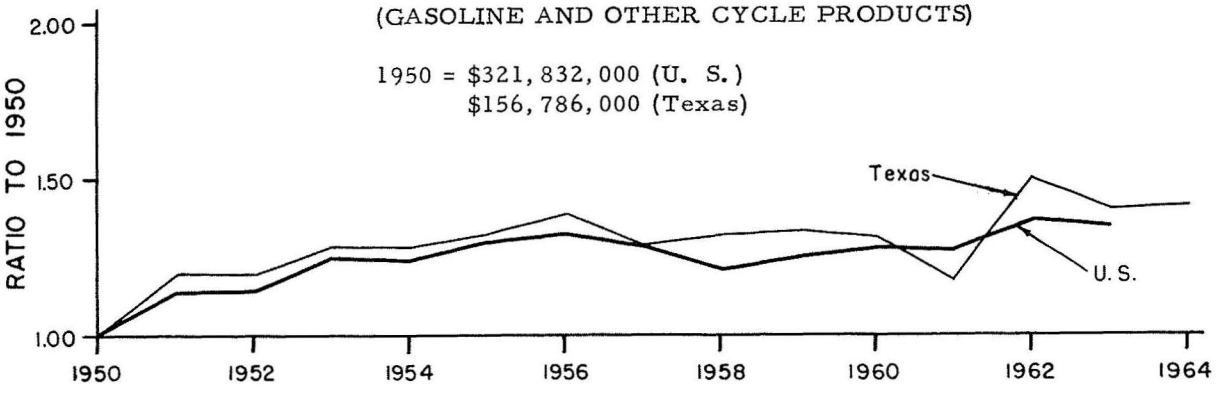
1950 = $50,266,000 (Texas)
1,665,006,000 gals. (Texas)



Natural Gas Liquids

Trend in the production of natural gas liquids has been characterized by steady increase in production of LP gas and relatively uniform production of gasoline and other cycle products. Continued growth of commercial and domestic markets and chemical manufacture markets will insure continued growth of the natural gas liquids industry. The most serious problem in recent years has been oversupply owing to increased natural gas production. As a result, price and value of LP gas have generally declined since 1960; gasoline and other cycle products have declined slightly in value since 1962. The problem of oversupply is being reduced with development of underground storage (salt domes and beds); more than 100 facilities have underground storage capacities totaling about 60 million barrels. Texas is the principal producer of natural gas liquids, supplying more than 50 percent of the domestic output. During 1963, 273 gasoline plants and 32 cycling plants operated in the State, chiefly in South Texas, East Texas, West Texas, and the Texas Panhandle.

Chart 11. PRODUCTION OF NATURAL GAS LIQUIDS
(GASOLINE AND OTHER CYCLE PRODUCTS)



Helium

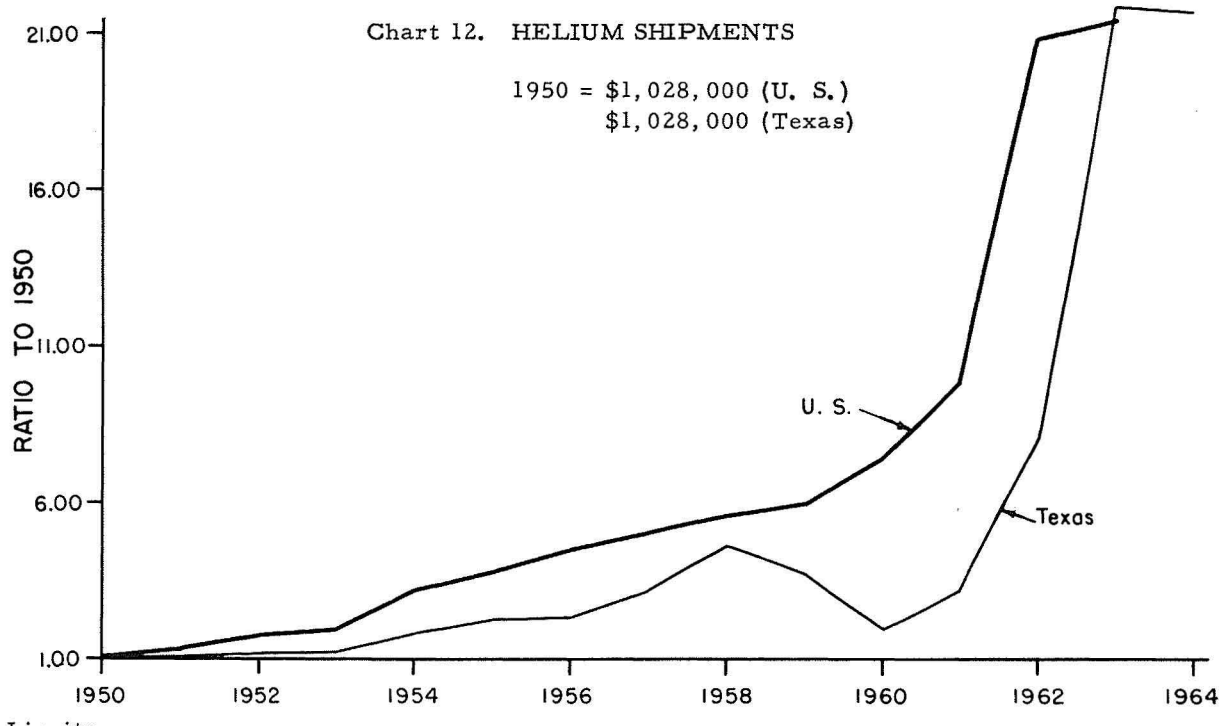
Trend in the production of helium, a by-product of natural gas, is controlled by activities of the Federal Government and provisions of the Helium Act (Public Law 86-777). Value of Texas shipments of helium increased steadily from 1950 to 1958; decline in shipments during 1959-1960 was due to large storage of Texas production with shipments for the national market made from plants outside the State. The sharp increase in value of helium shipments, both for Texas and the United States, during 1962 was the result chiefly of price adjustments

(increased from $15.50 for Federal customers and $19.00 for non-Federal customers to $35.00 per thousand cubic feet for all customers) required under provisions of the amended Helium Act to liquidate costs of the long-range helium conservation program of the U. S. Government. Volume of production has also increased sharply during the past three years to meet Federal Government needs (a prime use of helium currently is in pressurizing liquid-fueled rockets).

Texas production of helium is confined to the Texas Panhandle. Two plants are operated by private firms with government contracts for purchase, and two plants are owned and operated by the U. S. Bureau of Mines. Government-purchased helium is stored at the Cliffside gas field near Amarillo. Liquid helium is processed by one firm at Amarillo.

Chart 12. HELIUM SHIPMENTS

1950 = $1,028,000 (U. S.)
$1,028,000 (Texas)



Lignite

Lignite or low-grade coal is produced at two places in Texas as an industrial fuel for power generation and as a raw material for the manufacture of activated carbon. Prior to extensive production of oil and gas, lignite was a chief fuel source. In local areas or under special circumstances lignite can compete with natural gas as a large-volume source of fuel, though its future use as a fuel will depend generally on the availability and cost of natural gas. Lignite is also a potential source of several nonfuel products, but at present most of these products can be obtained more cheaply from other hydrocarbon raw materials.

NONMETALLIC NONFUEL ROCKS AND MINERALS

Since 1950 the value of nonmetallic, nonfuel minerals produced in Texas has increased at a rate about twice that of the fuel minerals. Production of nonmetallics in 1964 was 2.2 times that in 1950, while value of production of fuel minerals was 1.5 times 1950 production. Chief growth has been in the raw materials and products used in construction and building (cement, structural clay, building lime, crushed stone, sand and gravel, gypsum, and asphaltic limestone) with 1964 production of these valued at 2.8 times that of 1950. As a group, the chemical material minerals (chemical lime and limestone, salt, sulfur, and natural sodium sulfate) have increased only slightly since 1950 due to substantial decrease in the value of sulfur production; value of chemical raw materials exclusive of sulfur produced in 1964 was 8 times 1950 value. Production of the special use rocks and minerals (e.g., fire clay, silica sand, bentonite, talc, vermiculite) is 2.1 times greater than 1950 production, though these commodities constitute only a small percent of the total value of the nonmetallic, nonfuel minerals. Of the total value of nonmetallic minerals, construction raw materials and products have increased from 43 to 66 percent since 1950, chemical raw materials have decreased from 55 to 32 percent, and the special use raw materials have maintained at about 2 percent.

Chart 13. PRODUCTION OF MINERALS EXCLUSIVE OF FUEL MINERALS

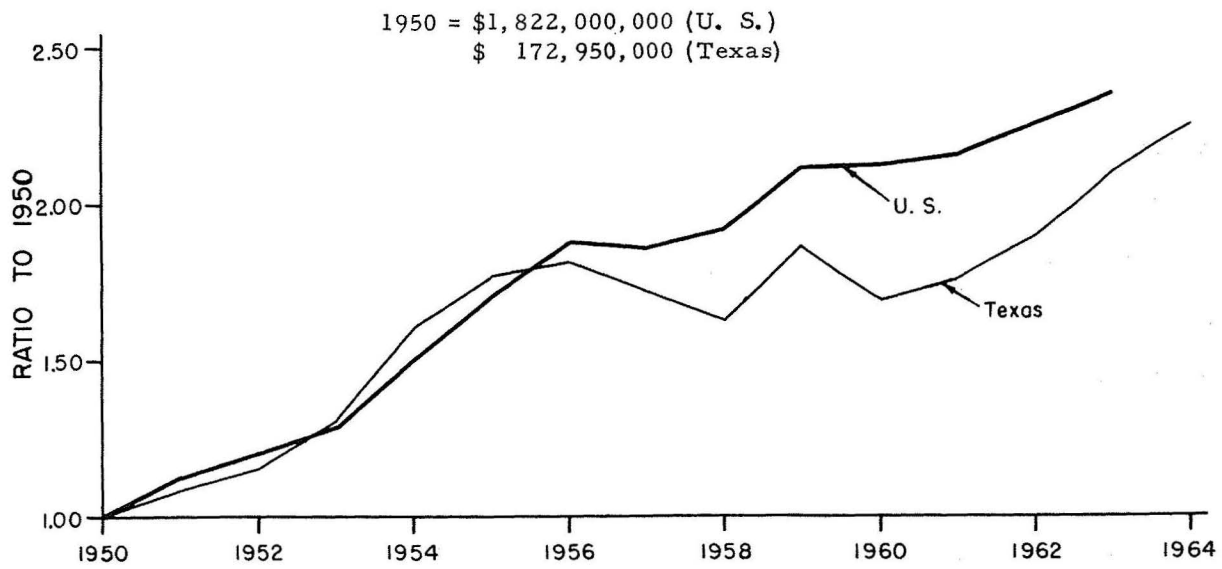
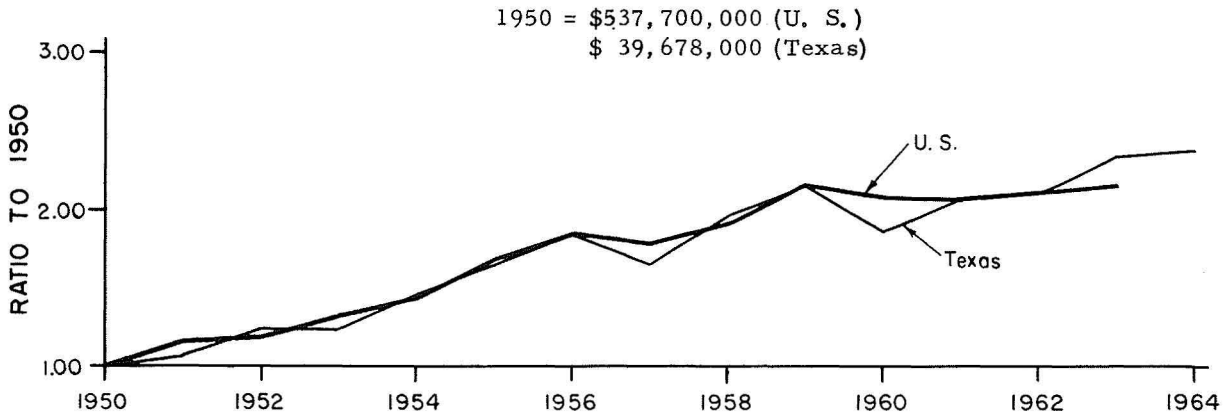


Chart 14. CEMENT PRODUCTION



Construction Materials

Cement

In terms of value cement is the chief construction material manufactured from mineral raw materials, representing about 1/3 the total value of the various constructional mineral materials. Production is geared closely to industrial and constructional activity and is centered chiefly in more heavily populated parts of the State. Principal raw materials are chalk and limestone deposits of Central Texas and oyster shell from Gulf Coast bays.

Production of cement has increased steadily, with 1964 production valued at about 2.4 times that of 1950. Annual increase in value of production has been recorded each year since 1950, except 1953, 1957, and 1960--years of general decline in business activity nationally. Overcapacity plagues the Texas cement industry even more than it plagues the National cement industry; currently, Texas production is about 70 percent of rated capacity compared with production at more than 90 percent capacity during 1955 and 1956. Production was at lowest percent of capacity in 1960. With continued plans for construction of new plants there is little probability that overcapacity will diminish significantly, though increased shipments and ever rising demand will possibly narrow the gap between production and capacity. A trend toward vertically integrated construction companies may pose a long term problem for the cement industry. Currently, three such companies are in prospect for Texas. Extent of vertical integration will depend on decisions by the Federal Trade Commission.

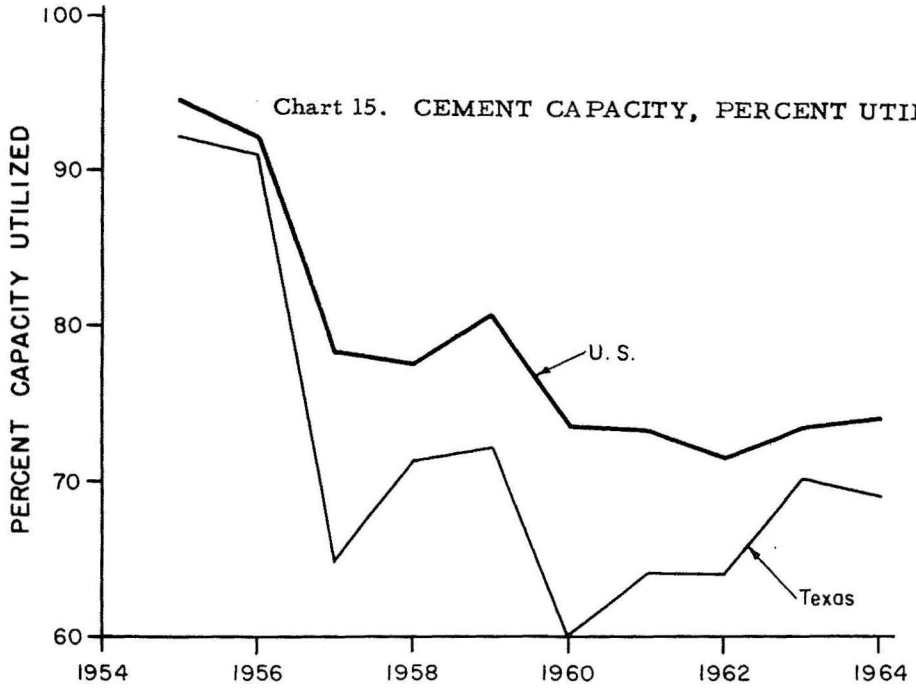


Chart 15. CEMENT CAPACITY, PERCENT UTILIZED

Aggregates and Base Materials

Materials used extensively in Texas as aggregate, base material, fill, ballast, etc., in construction include crushed stone (several varieties, chiefly limestone and shell), sand and gravel, clay as manufactured lightweight aggregate, and asphaltic limestone. As with cement, consumption is geared closely to constructional activity. Since 1950, as demand for these materials increased nearly four-fold, crushed stone has displaced sand and gravel as the chief source of aggregate and base material. In 1950 value of crushed stone production was less than half that of sand and gravel; currently, crushed stone production is nearly twice that of sand and gravel. Production of crushed stone and sand and gravel in Texas has increased steadily to rapidly, with decline in production only at times of general decline in

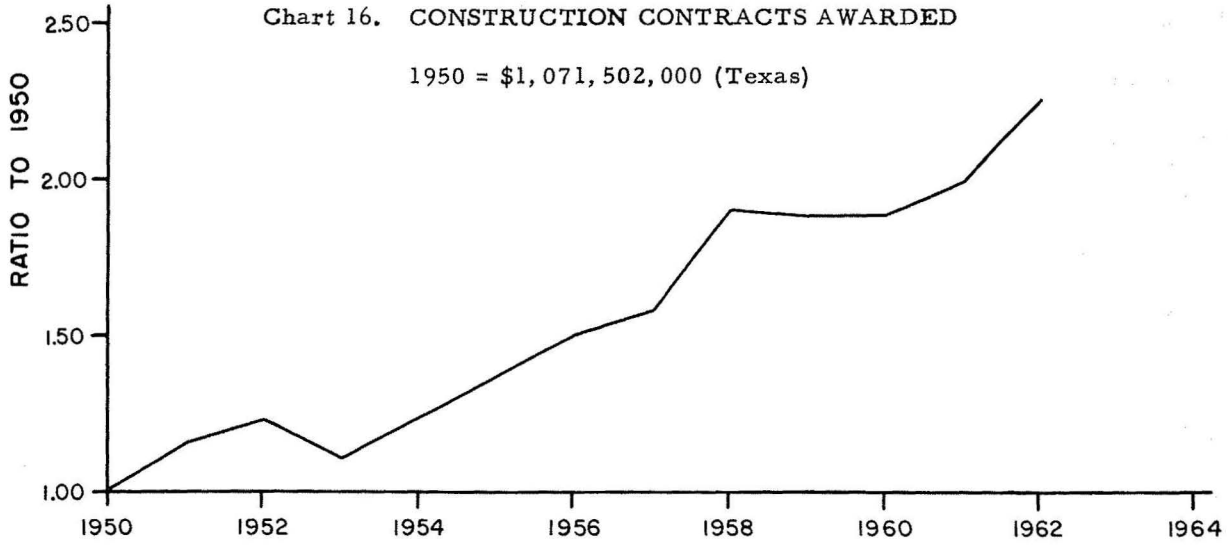


Chart 16. CONSTRUCTION CONTRACTS AWARDED

1950 = $1,071,502,000 (Texas)

business activity. Value of crushed stone production has increased 7 times 1950 production; sand and gravel has increased about 2.5 times. Crushed stone production has been somewhat less susceptible to business declines than sand and gravel chiefly because of more varied uses of crushed stone.

Principal problem in the crushed stone and sand and gravel industries in recent years has been a cost-prize squeeze. While prices have increased about 30 percent, capital costs have increased from 200 to 400 percent; also wages have increased at a rate nearly twice that of productivity per unit of labor force. The rapidly increasing practice of base and sub-grade stabilization with lime and other materials has cut into the crushed stone market in highway construction.

Chart 17. PRODUCTION OF STONE, SAND, AND GRAVEL

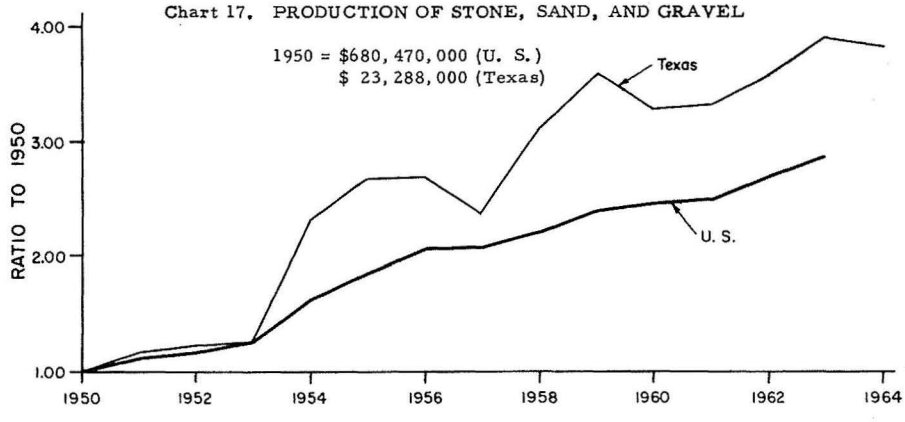


Chart 18. PRODUCTION OF SAND AND GRAVEL

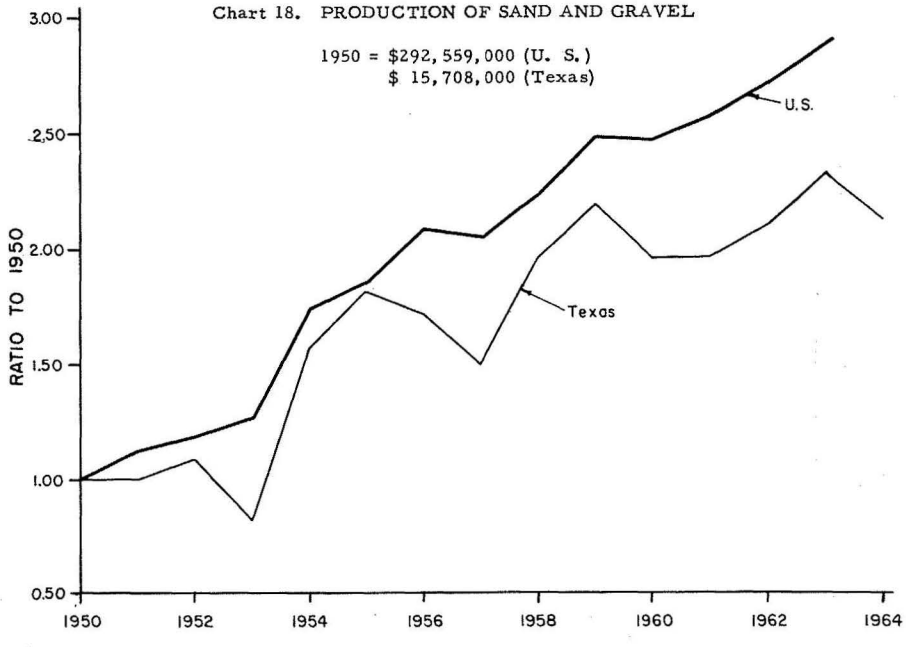
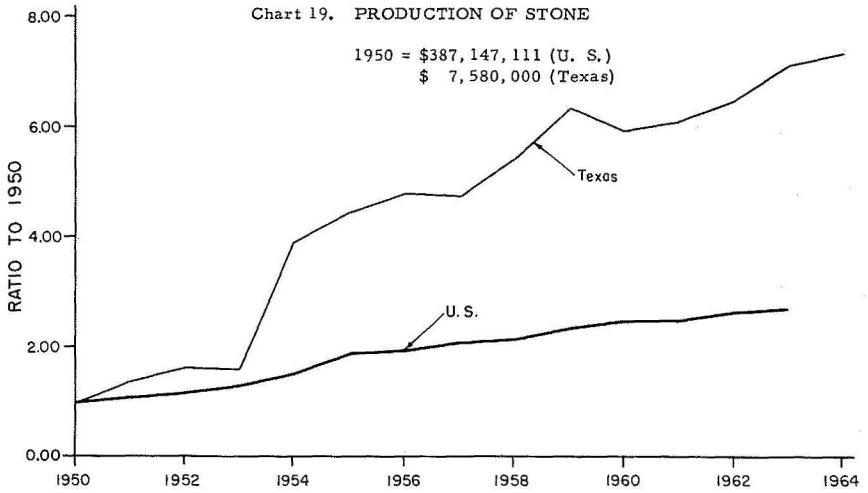


Chart 19. PRODUCTION OF STONE



Limestone and Shell

Limestone and shell are the chief raw materials used as crushed stone aggregate and base material (75 and 20 percent, respectively), as well as raw materials for the manufacture of cement and lime. Total value of limestone is about 3 times that of shell. Shell is produced entirely from shallow bays along the Texas coast; limestone is produced chiefly in the central part of the State, though large tonnages are shipped to the heavily populated coastal areas. Production of crushed limestone has increased sharply since 1953 and currently its total value is about 7 times that of 1950. Production declines were recorded in 1960 and 1961, coinciding with State-wide decline in construction activity. Shell production increased nearly 1.7 times from 1950 to 1957; since 1958 production has been relatively steady.

Chart 20. PRODUCTION OF LIMESTONE

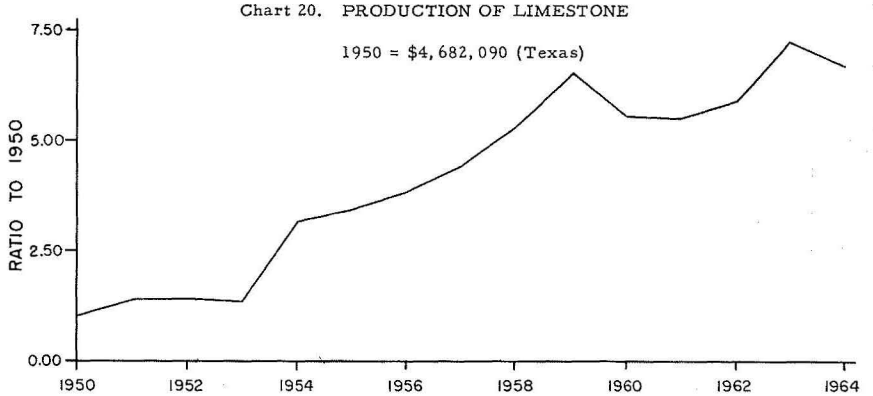
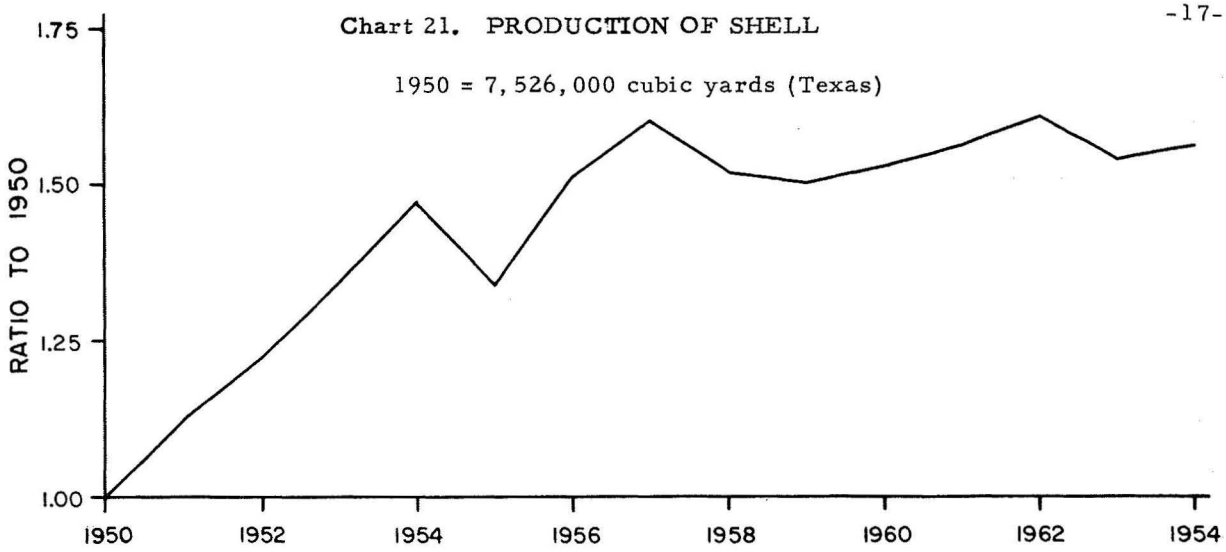


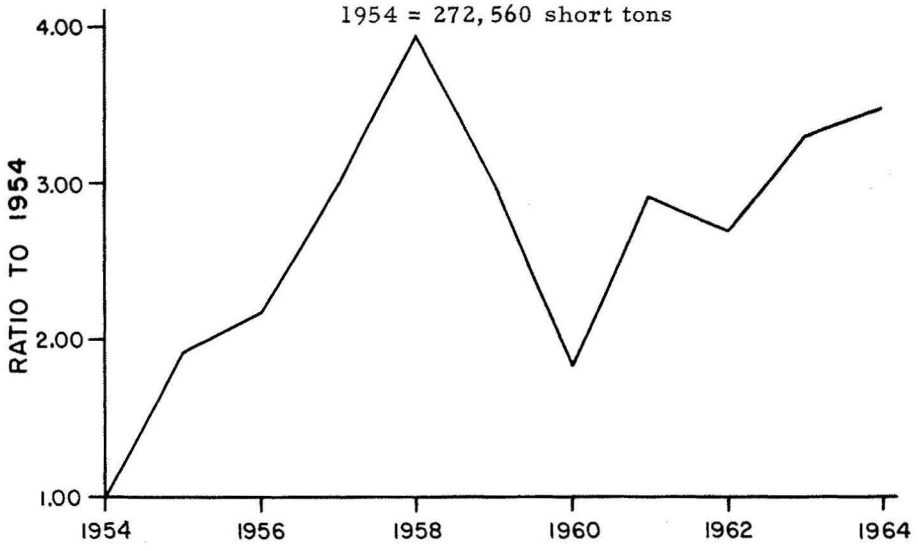
Chart 21. PRODUCTION OF SHELL



Manufactured Lightweight Aggregate

Manufacture of lightweight aggregate from clay increased rapidly in Texas from 1954 to 1958. Sharp declines in 1959 and 1960 have been followed by a general upward trend in production since 1961. The bulk of lightweight aggregate is used in fabrication of concrete blocks and precast concrete. Significant future increases in production of manufactured aggregate will depend on its suitability for use in certain large markets such as concrete and asphalt aggregate in highway construction. Manufacture of lightweight aggregate from by-product fly ash is competing with lightweight aggregate manufactured from naturally occurring materials in parts of the country and may ultimately affect the Texas industry. Increasing imports of tariff-free European pumice may affect industries situated in coastal areas.

Chart 22. PRODUCTION OF CLAY FOR LIGHTWEIGHT AGGREGATE

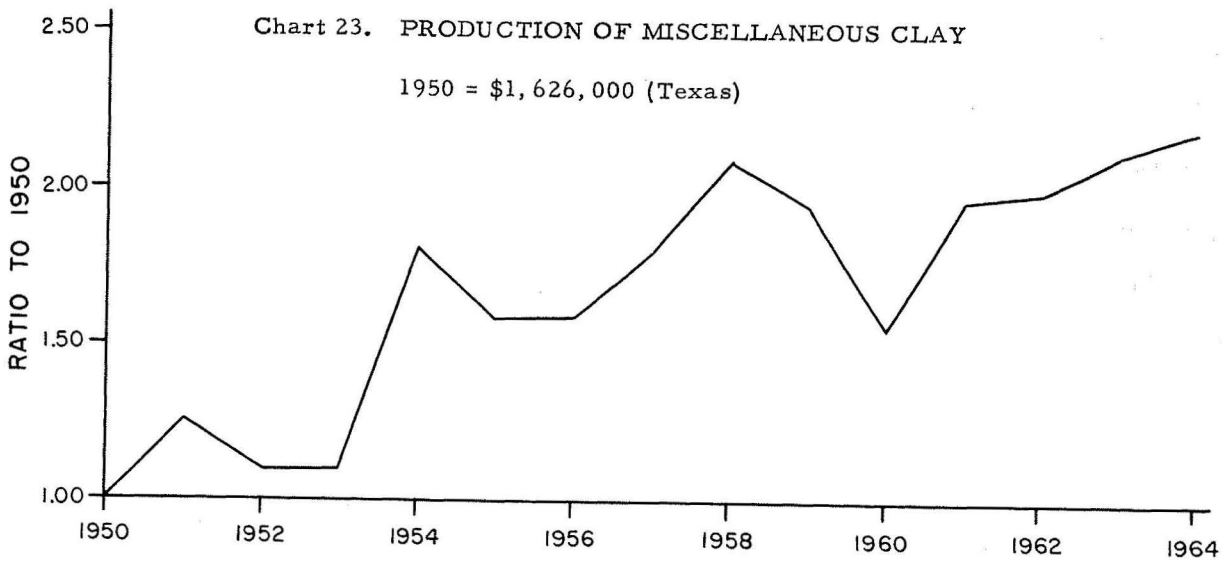


Miscellaneous Clay

Production of miscellaneous clay (used in manufacture of structural clay products, lightweight aggregate, and cement) has generally increased since 1950 with value of current production about twice that of 1950. Production, however, has been characterized by several upward and downward trends, coinciding generally with trends in business activity. Steadily increasing consumption of clay by the cement and lightweight aggregate industries will insure continued increases in production. Production of clay for use in structural clay products (chiefly brick and tile) likewise should increase, though these products must compete with a variety of other building materials. Most of the miscellaneous clay production in Texas is in the more heavily populated central and eastern parts of the State.

Chart 23. PRODUCTION OF MISCELLANEOUS CLAY

1950 = $1,626,000 (Texas)



Gypsum

Gypsum is used chiefly in the manufacture of plaster, wallboard, and lath, and, accordingly, production is geared very closely to building construction, especially private housing. Texas production has been marked by increases in value from 1953 to 1956 and 1957 to 1959 with decreases during the intervening period. Since decline in value of production in 1960, production has been stable to slightly increasing. Current production is about 1.5 times that of 1950.

Continued expansion in private housing, in size as well as number, will increase demand for gypsum products.

Principal production in Texas is in the Sweetwater district of West Texas.

Chart 24. PRODUCTION OF GYPSUM

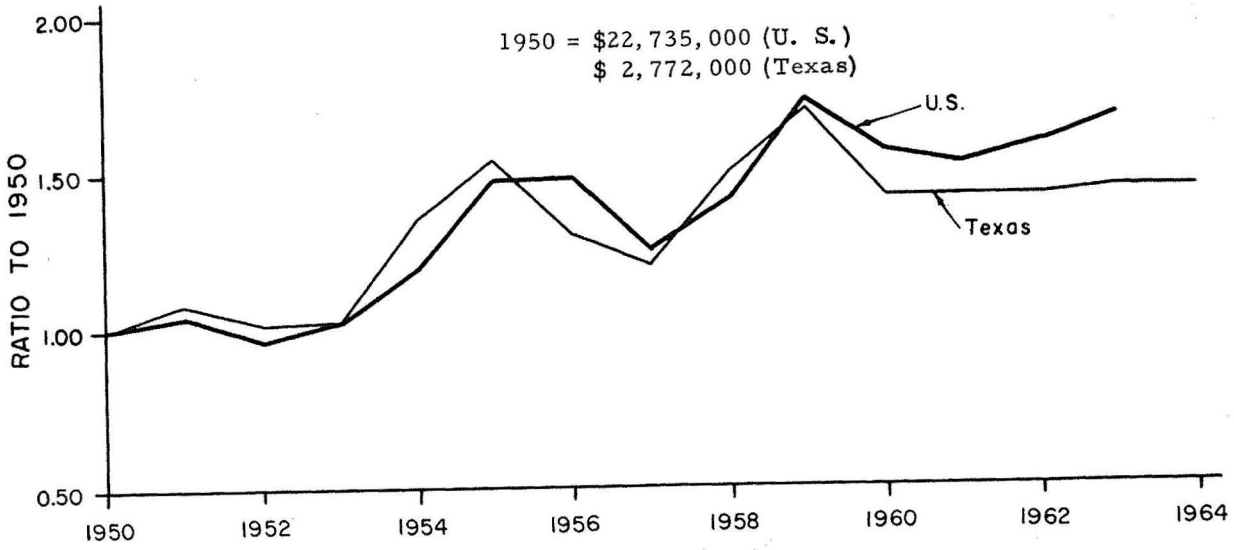
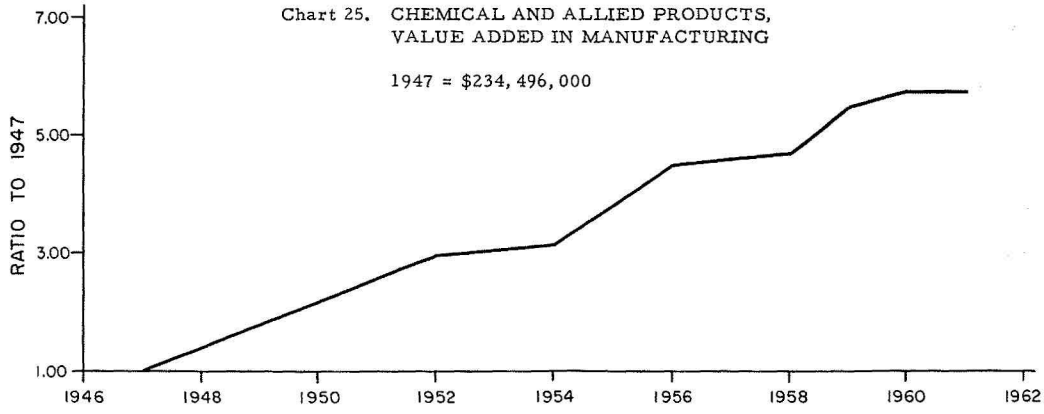


Chart 25. CHEMICAL AND ALLIED PRODUCTS, VALUE ADDED IN MANUFACTURING

1947 = $234,496,000



Chemical Materials

Lime

Lime is produced in Texas from high-purity limestone in the central part of the State and from shell dredged from shallow bays along the Texas coast. Production from these two sources is about equal and has been since 1950.

Production value of lime has climbed significantly since 1950 with current value more than 6 times that of 1950. Principal consumption is for chemical and industrial uses, which account for about 70 percent of the total value of production. Production of constructional lime has increased tremendously since 1957 (currently about 25 times 1950 production), chiefly due to increasing use in stabilization of road bases and sub-grades. The only decrease in use of lime is as aglime, now largely displaced by finely ground uncalcined limestone. Most of the Texas production of lime is consumed within the State. Production along the coast is largely captive.

As a low-cost chemical raw material, lime consumption by the chemical industry should increase. Industrial uses likewise should increase. The rapidly expanding practice of hydrated lime soil stabilization with increased highway construction will enlarge consumption of constructional lime.

Construction of lime-recovery plants for reprocessing lime from waste sludge may pose a future problem in the open market for lime.

Chart 26. PRODUCTION OF LIME

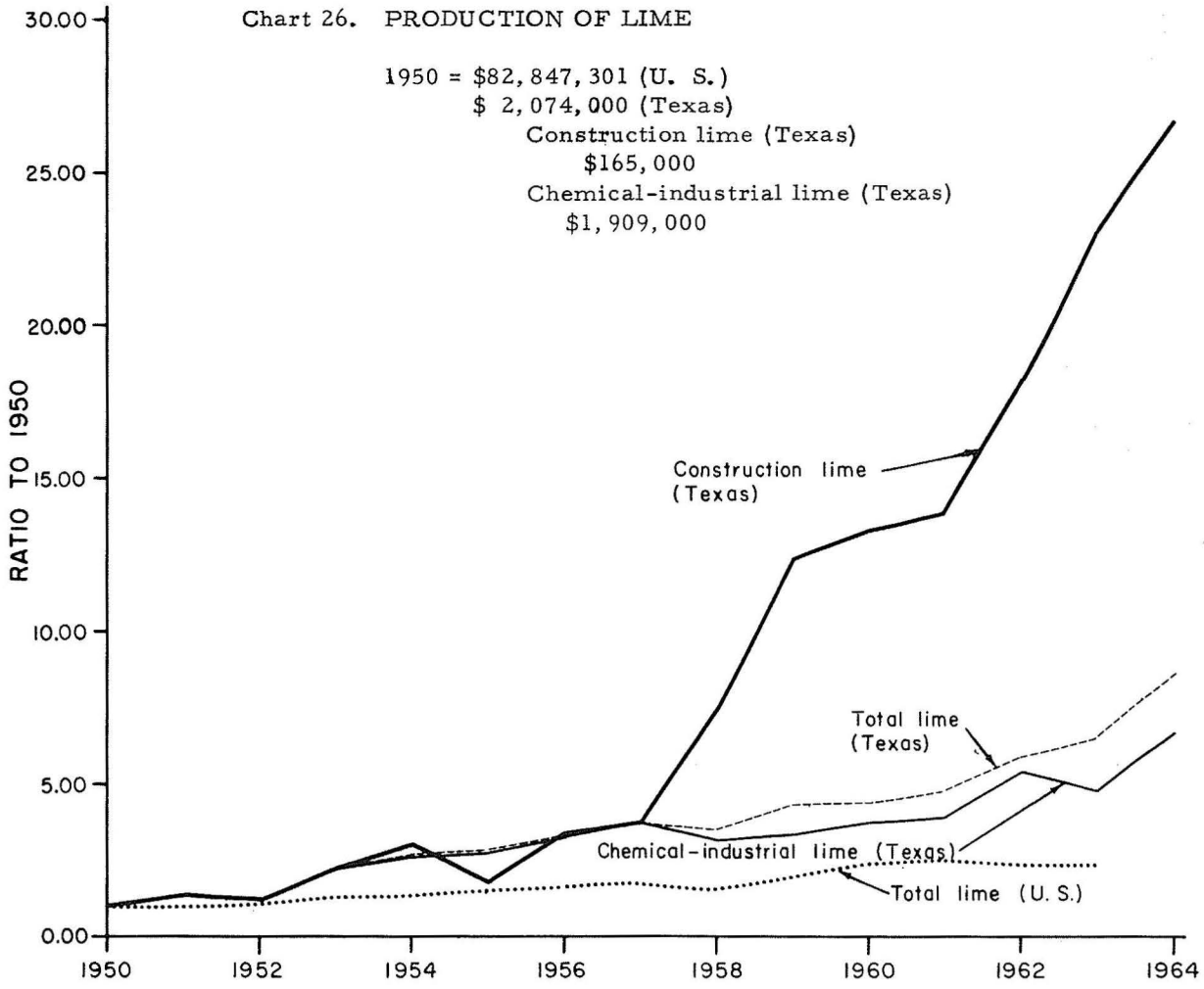
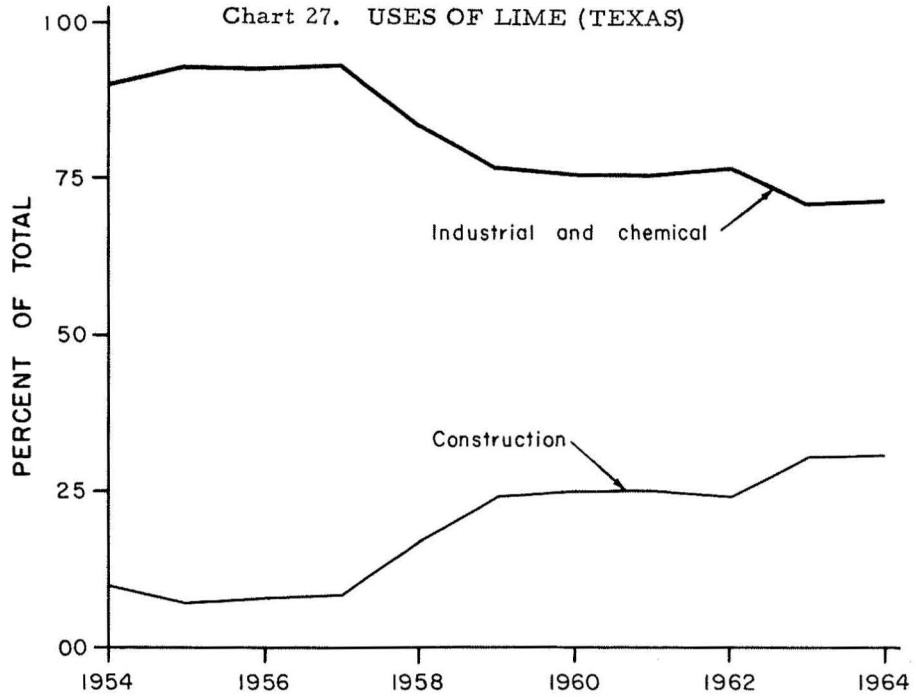


Chart 27. USES OF LIME (TEXAS)

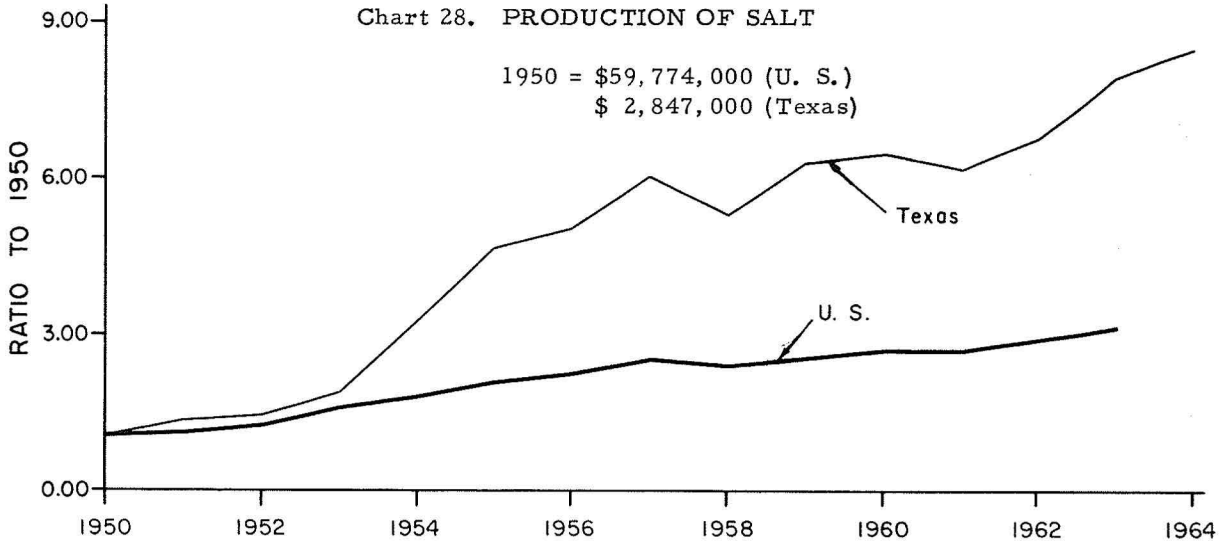


Salt

Salt is a basic raw material for the heavy chemical industry, and with the growth of this industry along the Texas coast, salt production has increased significantly in recent years. Current value of production is about 9 times that of 1950 production, compared with a three-fold increase in National production during the same period of time. Most Texas production is as salt-in-brine from coastal salt domes; production is largely captive and used mainly in the manufacture of chlorine, caustic soda, and other sodium and chlorine compounds. Most production is consumed within the State.

Accessible reserves are almost unlimited and with continued development of the State's chemical industries, production of salt will increase.

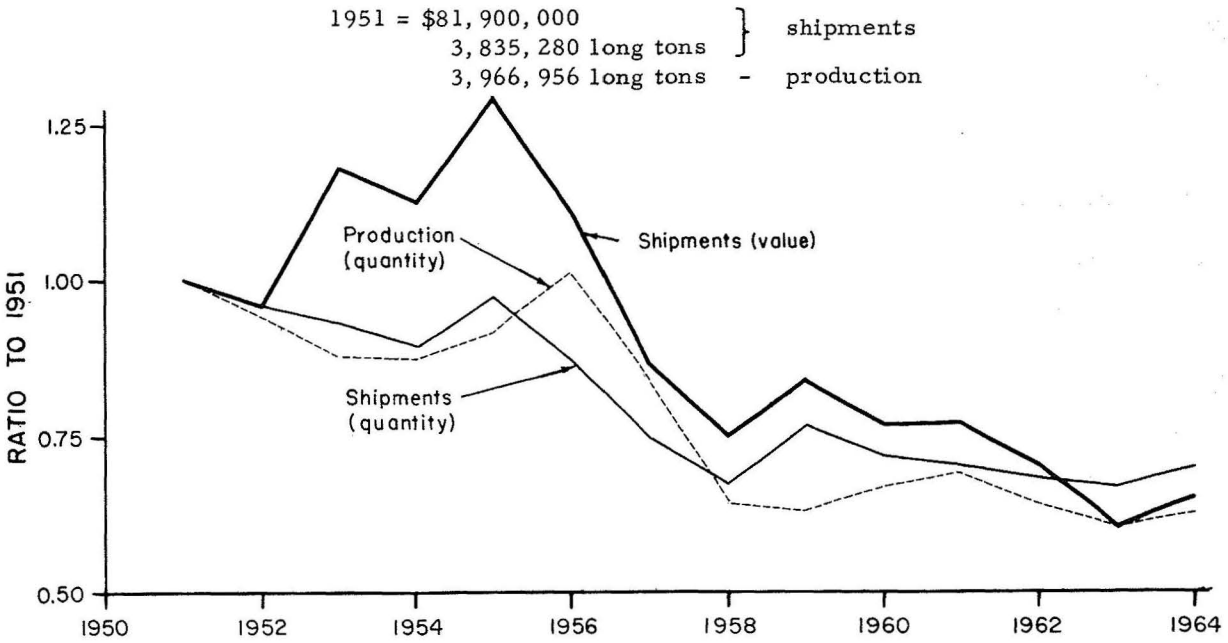
Chart 28. PRODUCTION OF SALT



Sulfur

Sulfur is produced in Texas as Frasch sulfur from caprock deposits on coastal salt domes and as recovered sulfur, a by-product from sour gas. With exception of the past two years Texas has for many years previously led the Nation in the production of Frasch sulfur; the State currently leads in the production of recovered sulfur. During the period of world shortage of sulfur in the early 1950's, value of shipments from Texas producers generally rose with record shipments in 1955. From 1956 to 1958, value and quantity of production and shipments dropped drastically. Chief reason for decline was the rapid growth of foreign sulfur industries (chiefly Mexican Frasch and Canadian and French recovered sulfur) which resulted in increased U. S. imports and decreased exports. Price of domestic sulfur was cut

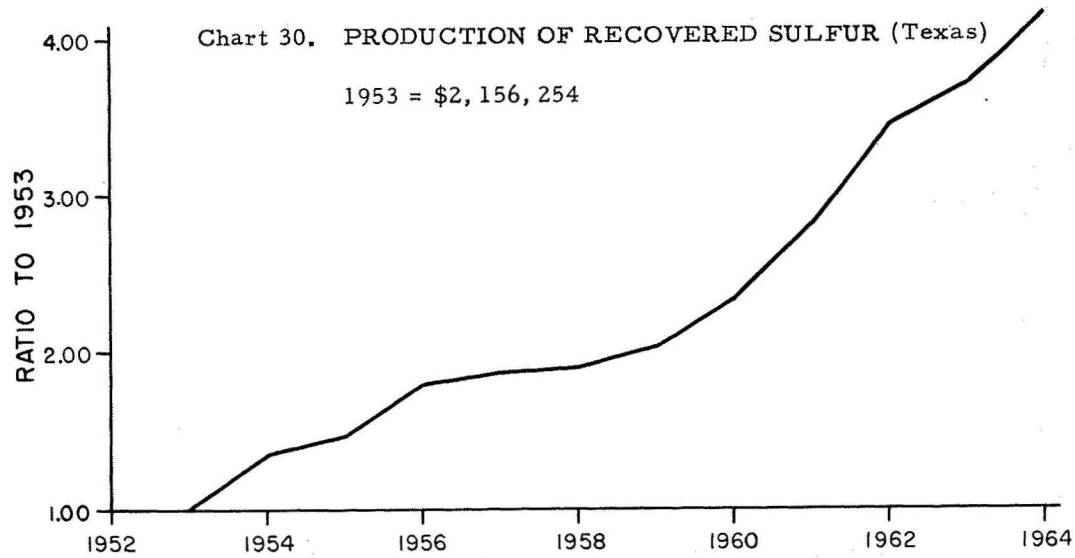
Chart 29. SHIPMENTS AND PRODUCTION OF FRASCH SULFUR (Texas)



in 1956 to compete with foreign production. With the exception of a few yearly increases, Texas production since 1958 has been generally steady to slightly decreasing. Increasing efficiency by delivering sulfur molten to customers, increasing world demand, and a balance between world supply and demand will probably lead to an increase in production of Texas Frasch sulfur.

Production of recovered sulfur in Texas has increased, with current production about 4 times that of 1951. Recovered sulfur now contributes about 15 percent of the total State value of sulfur produced; it has made significant inroads on inland markets of sulfur.

Chart 30. PRODUCTION OF RECOVERED SULFUR (Texas)

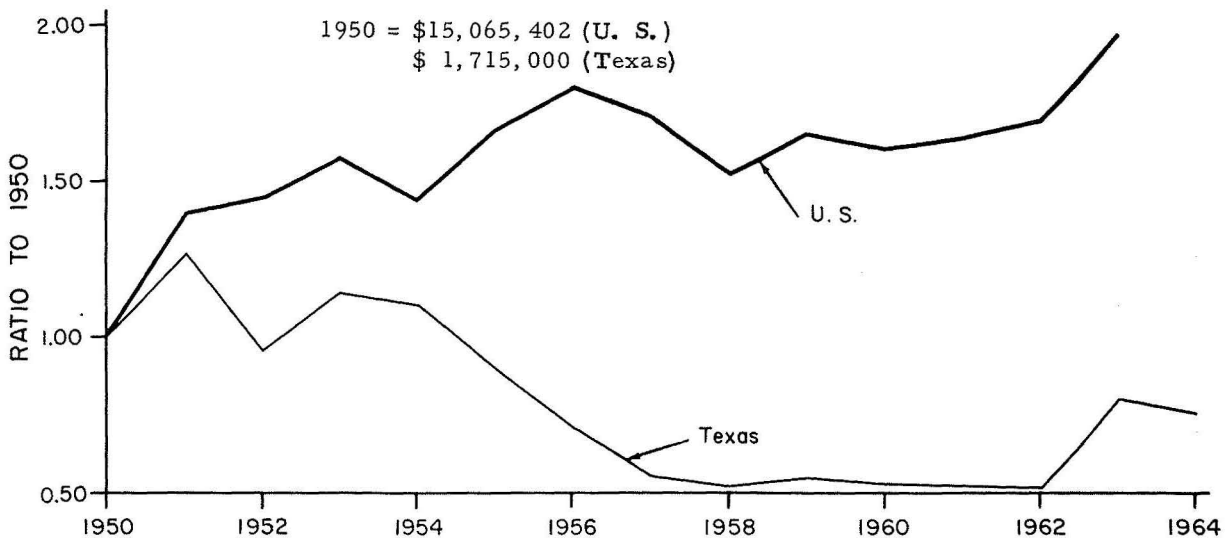


Other Nonmetallic Minerals

Bentonite

Production of bentonite and fullers earth in Texas was relatively steady during the early 1950's, decreased sharply from 1954 to 1957, and has remained steady to slightly increasing in the past seven years. This trend contrasts with the generally increasing national production of bentonite and fullers earth. Decline in Texas production is chiefly due to decline in oil drilling, decreased use of bentonite in oil refining, and development of quality deposits in other States. In National consumption the rapidly increasing use of bentonite in pelletizing iron ore and increasing use as absorbents have compensated for decreased use by the oil industry. Future production of Texas bentonite will depend to a large extent upon oil activity in the State, demand for such uses as absorbents, and development of deposits in other States.

Chart 31. PRODUCTION OF BENTONITE AND FULLERS EARTH



Fire Clay

Production of fire clay generally has increased, though year-to-year variations have occurred. Fire clays in Texas not only are processed into refractory shapes but also are used extensively for nonrefractory purposes, such as the manufacture of structural clay products. Apparent irregularity in production is partly due to variations in reporting--whether certain clays used in making structural clay products are reported as fire clay or as miscellaneous clay. Future trend in production of Texas fire clay will depend on demand for quality, structural brick versus facing brick, as well as demand for refractory shapes.

Chart 32. PRODUCTION OF FIRE CLAY (Texas)

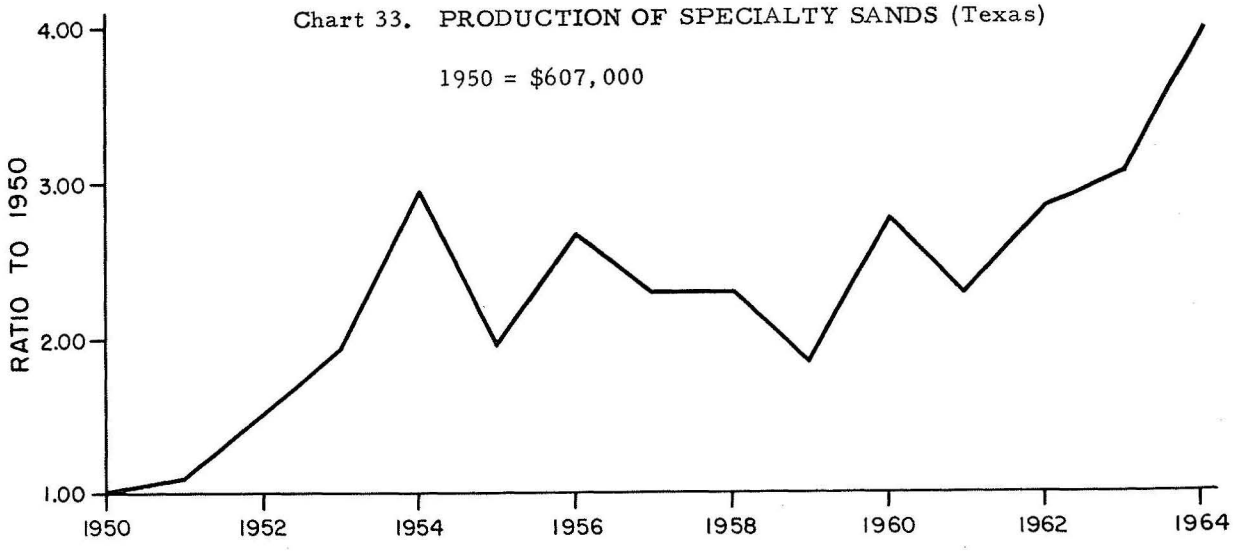
1950 = $675,000

Specialty Sands

Production of specialty sands, used as blast sand, glass sand, hydraulic-fracturing sand, source of silica products, etc., increased markedly during the early 1950's, was irregular from 1954 to 1962, and has again increased since 1962; value of current production is about 4 times that of 1950. Demand within the State for certain specialty sands, particularly glass sand, exceeds in-State production. Future production depends, therefore, not only on increased demand but also on the development of deposits of suitable quality. Exploitation of marginal deposits will depend on development of economical beneficiation processes.

Chart 33. PRODUCTION OF SPECIALTY SANDS (Texas)

1950 = $607,000

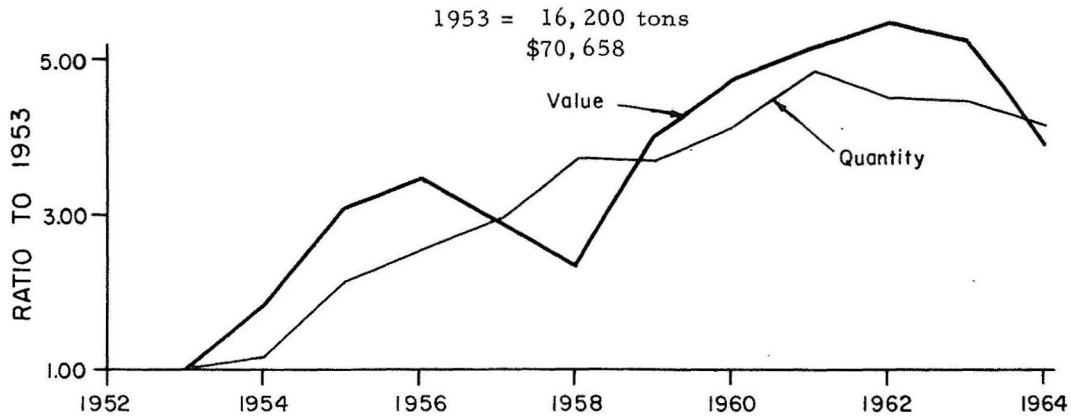


Talc and Soapstone

Principal production of talc in Texas began in 1952 with development of deposits in the Allamoore District of Trans-Pecos Texas. Production increased rapidly from 1952 to 1961 with 1961 production about 5 times that of the early 1950's. Value of production declined during 1957 and 1958. Since peak production in 1962, both value and volume of Texas talc production have declined slightly.

Chief utilization of Texas talc is in ceramics and insecticides; lesser amounts are used in manufacture of rubber and paint and as roofing and asphalt fill. A significant amount is exported. During the past decade Texas talc has established itself in the National market, and though production increases will probably be less in the future than in the past, production should increase steadily.

Chart 34. TALC PRODUCTION (Texas)



METALLIC MINERALS

The metals segment of the State's mineral industry accounts for about 1 percent of its total value. Production includes mining of iron ore from East Texas and uranium ore from South Texas, and extraction of magnesium from sea water at Freeport on the Texas coast. Since 1950, relatively small amounts of copper, gold, lead, silver, zinc, and mercury have been produced intermittently from Trans-Pecos Texas.

Production of iron ore at Daingerfield and Houston, using East Texas iron ore exclusively or in part, has generally decreased since 1950, though this production supplies only a small part of the total State demand for iron and steel. Decline in the oil industry, a chief consumer of Texas steel, has affected the Texas steel industry. Extensive development of Texas iron ores is hindered by the low grade of ores and lack of local coking coal but at the same time is enhanced by the large steel market in the State and an abundance of relatively cheap fuel and power. Application of direct reduction methods of processing should result in increased future development of Texas iron ores.

Production of uranium ore in Texas began in the late 1950's, remained relatively steady for a few years, and was curtailed during recent months. Currently production has resumed. Accumulation of stocks is an important factor in future production.

Although production and processing of in-State metallic ores are limited, Texas supports an important primary metals industry processing ores and concentrates from other States and especially from foreign sources. Eleven metals are currently processed at 18 plants in the State; secondary metals are recovered from scrap materials at 7 plants. Easy access of imported ores and access to world markets provided by the Texas coast, a well-developed inland transportation system, relatively cheap sources of fuel and power, and availability of at least certain metallurgical process raw materials (e. g., fluxstone) account for the State's primary metals industry. Processed metals are shipped to national and world markets; metal consuming and fabrication facilities within Texas utilize only a small part of the total production.

SUMMARY

The Texas economy is in large part based on minerals, mainly on production of crude oil and natural gas. For more than 30 years value of these mineral fuels has accounted for more than 90 percent of the total value of minerals produced in the State. During the post-war period and more particularly during the past decade, production of nonfuel or nonmetallic minerals within the State has increased at a rate faster than that of the fuel minerals, reflecting development of a broader-based mineral industry. Since 1960 average annual production value of the nonfuel minerals has increased 7 percent; value of the mineral fuels has increased slightly less than 3 percent during the same period.

Although production of crude oil in recent years has been below peak production of the mid 1950's, value of natural gas and natural gas liquids has increased significantly. Nonfuel mineral growth has been chiefly in raw materials and products used in construction (e. g., cement, structural clay, building lime, crushed stone, sand and gravel, gypsum, and asphaltic limestone). Value of most mineral raw materials used in the chemical industries (e. g., salt, chemical lime and limestone, natural sodium sulfate) has also increased greatly; however, production of sulfur is now well below peak production of the mid 1950's. Production of certain of the minor nonmetallic minerals (e. g., fire clay, silica sand, talc, vermiculite) has increased, though production of thos e minerals closely tied to the oil industry (e. g., bentonite used as a drilling mud and in oil refining) has declined. Value of metallic minerals produced is small, amounting to only about 1 percent of the total mineral value. These include at the present time iron ore from East Texas, uranium from South Texas, and magnesium extracted from Gulf sea water. An important primary metals industry, however, exists within the State, processing ores and concentrates from other States and foreign sources.

The future mineral industry of Texas will continue to be dominated by the production of crude oil and natural gas. With increased industrialization and continued growth in population, production of the nonfuel, nonmetallic minerals will increase and at a faster rate than the fuel minerals, resulting in a more diversified mineral industry.

SOURCES OF DATA

Engineering and Mining Journal (monthly issues)

Oil and Gas Journal (weekly issues)

Rock Products (monthly issues)

U. S. Bureau of Mines, Minerals Yearbook (annual issues)

U. S. Bureau of Mines, Mineral Facts and Problems, 1960 edition (Bull. 585, 1015 pp.)

U. S. Bureau of Mines, Mineral Data Sheets (annual compilations)

Univ. Texas, Bureau of Business Research, Texas Business Review (monthly issues)

Univ. Texas, Bureau of Economic Geology, Mineral Resource Circulars