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THE MINERAL INDUSTRY IN KANSAS
IN 1956

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By

WALTER H. SCHOEWE

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THE MINERAL INDUSTRY IN KANSAS IN 1956

By
WALTER H. SCHOEWE

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ABSTRACT

Mineral production in Kansas in 1956 exceeded \$500,000,000. Of this amount 83.9 percent, or \$432,011,725, was derived from the mineral fuels and associated products; 14.1 percent, or \$72,606,852, from the nonmetals excluding mineral fuels; and 2.0 percent, or \$10,251,600, from the metals. Mineral production values were 5.5 percent greater in 1956 than in 1955. With the exception of stone and pumicite, or volcanic ash, all mineral commodities produced in 1956 were greater in value than in the previous year. Tonnage of stone although greater in 1956 than in 1955 was valued at 4.9 percent less than in 1955. Encouraging was the fact that the three minerals, lead, zinc, and coal, on the decline in recent years, showed appreciable gains when compared to values in 1955. Kansas produced 22 minerals, five others were available but not exploited; and at least six others, of still undetermined commercial value, were known in the state. Of the 105 counties in Kansas, 103 reported mineral production in 1956, two more than in 1955. Oil and gas have been or are being produced in 82 counties; sand and gravel production in 1956 was listed among 67 counties; and stone was produced in 41 counties. In 1956, each of 55 counties produced minerals worth \$1,000,-000 or more. Barton County, as in previous years, with a production value of \$42,411,624 continued to lead all other Kansas counties for first place. Ellis County with \$32,766,400 was second, and Russell County with \$27,882,436 was third in importance in 1956. Counties that exploited the most different minerals (6 or 7) were Cherokee, Leavenworth, Linn, Sedgwick, and Wyandotte. The counties that produced the greatest dollar value of minerals are those in which oil is found, mainly western Kansas counties, although Allen, Butler, Cherokee, Cowley, and Greenwood, all eastern Kansas counties, are included. Most important minerals produced in Kansas were oil, natural gas, cement, stone, natural gas liquids, clay and clay products, salt, sand and gravel, zinc, carbon black, coal, and lead. This report discusses the production and value of all minerals produced in the state in 1956 with comparison with 1955, and it includes directories of mineral producers on record as of December 31, 1956.

INTRODUCTION

The mineral wealth of Kansas has exceeded \$400,000,000 annually since 1951 and more than \$500,000,000 in 1956, an amount exceeding the average value of the wheat crop, all other crops, livestock, or poultry produced in the same period of time. Since 1932 Kansas has ranked among the upper 10 in the United States in the value of mineral commodities produced annually. Twenty-two minerals are produced commercially in the state; 5 others are available but currently are not exploited; at least 6 other minerals are known to exist but have not been studied sufficiently to determine their commercial possibilities, and at least 2 minerals

TABLE 1.—*Quality and value of Kansas mineral production, by commodities, 1955 and 1956*

| Commodity | Unit | 1955 | | 1956 | | Rank 1956 |
|------------------------------------------|--------------|-------------|----------------------------|-------------|----------------------------|--------------|
| | | Quantity | Value | Quantity | Value | |
| Carbon black | Pounds | 97,446,155 | \$ 5,553,883 | 105,680,834 | \$ 6,590,663 | 9 |
| Cement (masonry) | 376-lb. bbl. | 382,523 | 1,333,504 | 358,739 | 1,324,928 | 15 |
| Cement (natural) | do | * | * | * | * | 19 |
| Cement (portland) | do | 9,071,747 | 24,520,533 | 10,239,578 | 29,370,845 | 3 |
| Clay (raw) | Short tons | 767,662 | 873,016 | 977,099 | 1,169,048 | 16 |
| Clay and clay products | do | 739,086 | 9,000,000 | 876,006 | 10,000,000 | 5 |
| Coal | do | * | 3,118,943 | * | 4,003,500 | 11 |
| Diatomaceous marl | do | * | * | * | * | 24 |
| Gypsum (crude) | do | * | * | * | * | 17 |
| Helium | Cu. ft. | 42,749,600 | 662,619 | 45,035,200 | 698,000 | 18 |
| Lead (recoverable contents of ores) | Short tons | 5,998 | 1,640,603 | 7,635 | 2,397,390 | 13 |
| Natural gas | M. cu. ft. | 466,180,157 | 51,279,817 | 525,931,757 | 57,852,493 | 2 |
| Natural gas liquids | | | | | | |
| Butane | 42-gal. bbl. | 967,635 | 2,370,706 | 791,832 | 1,979,580 | 14 |
| Natural gasoline | do | 2,724,569 | 6,675,194 | 2,550,686 | 6,376,715 | 10 |
| LPG | do | 276,488 | 677,396 | 276,110 | 690,275 | 20 |
| Propane | do | 950,858 | 2,329,602 | 1,128,619 | 2,821,548 | 12 |
| Perlite ^a | Short tons | * | * | * | * | 23 |
| Petroleum (crude) | 42-gal. bbl. | 121,161,234 | 341,674,680 | 124,467,613 | 350,998,951 | 1 |
| Pumicite (volcanic ash) | Short tons | 2,320 | 59,710 | * | * | 26 |
| Salt (brine) | do | * | * | * | * | 21 |
| Salt (common) | do | 910,866 | 8,432,325 | 892,832 | 8,778,129 | 6 |
| Sand and gravel | Short tons | 10,664,986 | 6,909,666 | 12,515,164 | 8,022,312 | 7 |
| Sandstone (dimension) | do | * | * | * | * | 25 |
| Stone (limestone, sandstone, chat) | do | 12,446,885 | 15,887,269 | 13,421,077 | 15,644,189 | 4 |
| Vermiculite ^a | do | * | * | * | * | 22 |
| Zinc (recoverable content of ores, etc.) | do | 27,611 | 6,792,306 | 28,665 | 7,854,210 | 8 |
| *Undistributed | | | \$ 1,617,788 | | \$ 2,083,811 | |
| Total value | | | \$487,896,694 ^b | | \$514,870,177 ^b | |

^a Minerals processed but not mined in Kansas.

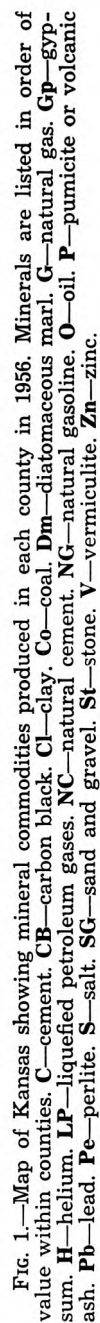
^b Totals adjusted to eliminate duplication in the value of clays and stone.

are processed into useful mineral commodities from raw materials shipped into the state from outside sources. In 1956 Kansas produced minerals valued at \$514,870,177, a gain of 5.5 percent when compared to the value of minerals produced in 1955. Table 1 presents data on annual mineral production in Kansas for 1955 and 1956, together with the rank of each mineral with respect to the other minerals produced in the state.

The distribution of minerals in the state is widespread. Oil and gas have been or are being produced in 82 counties; sand and gravel production in 1956 is listed among 67 counties, and at least among 75 in former years; and stone is at present being produced in 41 counties. Although coal is currently being mined in only 8 eastern Kansas counties, it is known to occur and has been mined in at least 22 other eastern Kansas counties and in 10 counties in the north-central part of the state. Likewise, salt and gypsum are widespread in Kansas even though production at present is restricted to no more than 6 counties. All but 3 of the 105 counties in Kansas reported mineral production in 1956, 2 fewer than in the previous year. For the first time Rawlins and Wichita Counties joined the rank of mineral producers in the state. Greeley, Lane, and Mitchell Counties reported no mineral production in 1956. In 1956, each of 55 counties produced minerals worth \$1,000,000 or more. Barton County, which produced minerals valued at \$42,-411,624, continued to lead all other Kansas counties for first place. Ellis County with \$32,766,400 was second in importance. Russell County with \$27,882,436 was third and led Butler (\$23,704,104) and Grant (\$20,429,391) in the \$20,000,000 to \$30,000,000 category. Counties each of which produced in 1956 mineral wealth valued between \$10,000,000 and \$20,000,000 were Rooks, Greenwood, Stafford, Rice, Graham, Cowley, Cherokee, Sedgwick, Allen, Barber, Stevens, McPherson, and Pawnee, 5 more counties in this

TABLE 2.—Range of value of 1955 and 1956 mineral production per county

| Value of annual production, millions of dollars | Number of counties producing minerals valued in this range | |
|----------------------------------------------------|---------------------------------------------------------------|------|
| | 1955 | 1956 |
| 40-50 | 1 | 1 |
| 30-40 | 2 | 1 |
| 20-30 | 4 | 3 |
| 10-20 | 8 | 13 |
| 1-10 | 38 | 37 |
| 0-1 | 47 | 47 |
| no production | 5 | 3 |



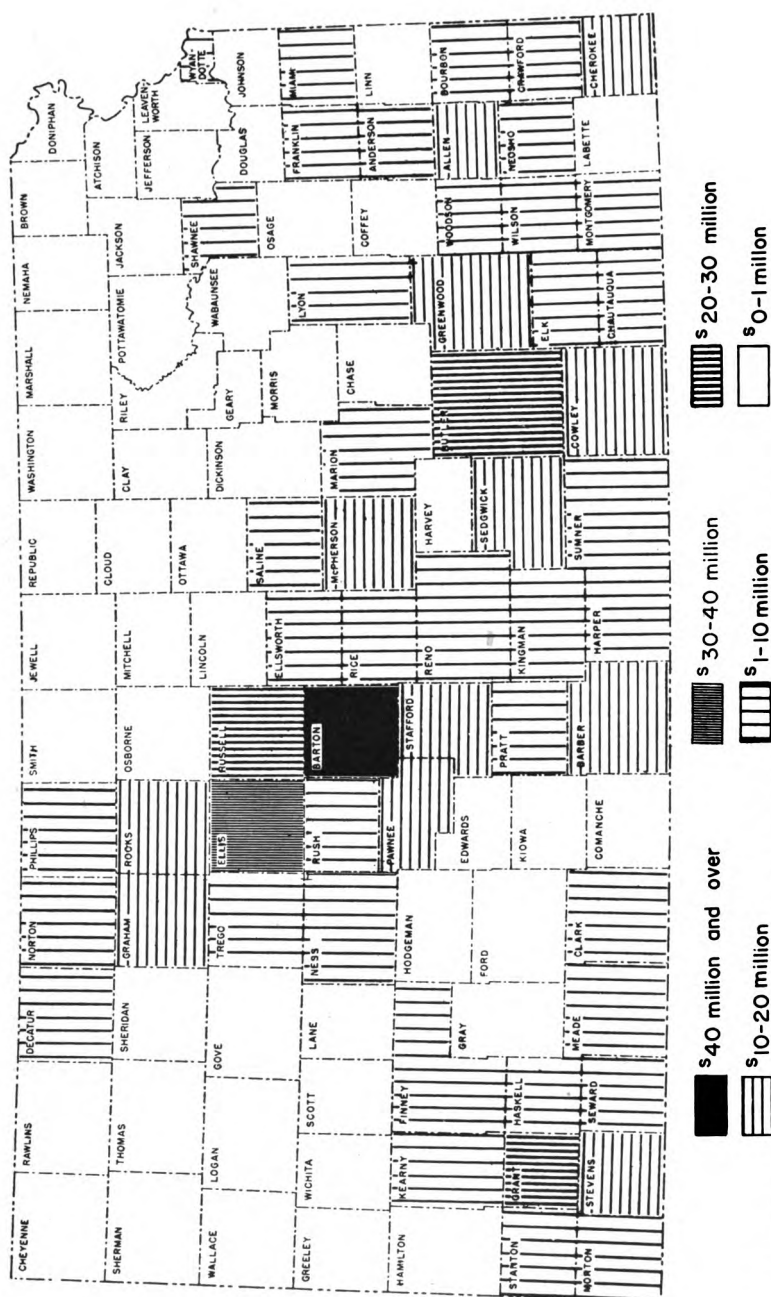


FIG. 2.—Map of Kansas showing range of value of 1956 mineral production per county.

category than in 1955. Table 2 summarizes the range of value of the 1956 mineral production per county with comparison for 1955.

The counties that produced the greatest dollar value of minerals are those in which oil is found. Most of these are western Kansas counties, but Allen, Butler, Cherokee, Cowley, and Greenwood, all eastern Kansas counties, are included. Ten out of the 55 counties producing \$1,000,000 or more in mineral wealth in 1956 derived their wealth mainly from the nonfuel minerals, and of these 9 are eastern Kansas counties, Reno being the only western county. The nonfuel mineral wealth producers are: Allen, Bourbon, Cherokee, Elk, Montgomery, Neosho, Reno, Shawnee, Wilson, and Wyandotte Counties. Counties that exploited the most different minerals (6 or 7) were Cherokee, Leavenworth, Linn, Sedgwick, and Wyandotte; of these Cherokee and Wyandotte produced no oil (Fig. 1). A summary evaluation based upon mineral fuels and nonfuel minerals for Kansas counties in 1956 is presented in Table 3 and Fig. 2.

TABLE 3.—*Value of mineral production in Kansas by counties in 1956*

| County | Value of mineral production | | | Commodities ^b in order of decreasing importance |
|------------|-----------------------------|--------------|--------------|------------------------------------------------------------|
| | Fuels ^a | Nonfuels | Total | |
| Allen | \$ 2,397,056 | \$ 9,064,974 | \$11,462,030 | C, O, St, Cl, G |
| Anderson | 1,857,266 | 213,955 | 2,071,216 | O, St, SG |
| Atchison | ..... | 287,725 | 287,725 | St |
| Barber | 11,156,777 | * | * | O, G, Gp, SG |
| Barton | 42,126,221 | 285,403 | 42,411,624 | O, SG, Cl, G |
| Bourbon | 128,681 | 1,023,722 | 1,152,403 | NC, St, O, Co |
| Brown | 4,044 | * | * | SG, O |
| Butler | 22,949,747 | 754,357 | 23,704,104 | O, St, G |
| Chase | 96,522 | 252,766 | 349,288 | St, O, G, SG |
| Chautauqua | 2,941,582 | * | * | O, St, G, SG |
| Cherokee | 2,548,002 | 10,815,846 | 13,363,848 | Zn, Co, Pb, St, Cl, G |
| Cheyenne | ..... | / | * | SG |
| Clark | 1,413,573 | * | * | O, G, SG |
| Clay | ..... | 84,735 | 84,735 | St, SG |
| Cloud | ..... | 238,400 | 238,400 | Cl, SG |
| Coffey | 469,561 | 67,090 | 536,651 | St, O, Co, G, SG |
| Comanche | 35,988 | * | * | G, O, SG |
| Cowley | 13,210,857 | 942,568 | 14,153,425 | O, St, SG, NG, LP |
| Crawford | 1,519,478 | * | * | Co, Cl, O, G |
| Decatur | 1,112,177 | * | * | O, SG |
| Dickinson | 359,959 | 382,834 | 742,793 | St, O, SG |
| Doniphan | ..... | 824,229 | 824,229 | St |
| Douglas | 28,770 | * | * | SG, St, O |
| Edwards | 323,131 | * | * | O, G, SG |
| Elk | 873,537 | 1,133,936 | 2,007,473 | St, O, G, SG |
| Ellis | 32,763,775 | * | * | O, SG |
| Ellsworth | 8,431,952 | 896,259 | 9,328,211 | O, S, SG |

| County | Value of mineral production | | | Commodities ^b in order of decreasing importance |
|--------------|-----------------------------|-----------|------------|---------------------------------------------------------------|
| | Fuels ^a | Nonfuels | Total | |
| Finney | 5,517,720 | 104,794 | 5,622,514 | G, O, NG, SG |
| Ford | 52,512 | 89,200 | 141,712 | SG, G, O |
| Franklin | 983,102 | 143,425 | 1,126,527 | O, St, Cl, Co |
| Geary | .... | 345,700 | 345,700 | St, SG |
| Gove | 71,400 | * | * | O, SG |
| Graham | 17,033,435 | * | * | O, St |
| Grant | 20,529,121 | * | * | G, CB, LP, NG, SG |
| Gray | .... | * | * | SG |
| Greeley | .... | .... | .... | None reported |
| Greenwood | 19,143,855 | * | * | O, St |
| Hamilton | 489,377 | 10,925 | 500,302 | G, O, SG |
| Harper | 2,467,129 | * | * | O, G, SG |
| Harvey | 684,072 | * | * | O, SG, G |
| Haskell | 4,565,949 | * | * | G, NG, O, SG |
| Hodgeman | 340,805 | .... | 340,805 | O |
| Jackson | .... | * | * | St |
| Jefferson | 5,740 | 356,949 | 362,689 | O |
| Jewell | .... | 514,148 | 514,148 | St, Cl, SG |
| Johnson | 22,879 | 252,521 | 275,400 | St, O |
| Kearny | 7,644,693 | * | * | G, NG, O, SG |
| Kingman | 6,574,403 | * | * | O, G, NG, LP, SG |
| Kiowa | 724,702 | * | * | O, G, SG |
| Labette | 294,422 | * | * | O, St, G, Co |
| Lane | .... | .... | .... | None reported |
| Leavenworth | 14,500 | 916,778 | 931,278 | St, SG, Cl, O, G |
| Lincoln | .... | * | * | St, P |
| Linn | 254,981 | 153,753 | 408,734 | O, St, SG, Co, G |
| Logan | .... | * | * | SG |
| Lyon | 984,967 | 188,139 | 1,173,106 | O, SG, St |
| Marion | 3,957,778 | * | * | O, St, G |
| Marshall | .... | 650,740 | 650,740 | Gp, SG |
| McPherson | 11,229,702 | * | * | O, G, SG |
| Meade | 2,191,838 | .... | 2,191,838 | O, G |
| Miami | 1,905,674 | * | * | O, St, G |
| Mitchell | .... | .... | .... | None reported |
| Montgomery | 2,160,083 | 6,051,111 | 8,211,194 | C, O, G, Cl |
| Morris | 762,088 | 96,974 | 859,062 | O, St, SG, G |
| Morton | 9,059,023 | .... | 9,059,023 | G, O |
| Nemaha | 70,009 | * | * | O, St |
| Neosho | 1,825,646 | 5,061,065 | 6,886,711 | C, O, St, G |
| Ness | 1,369,510 | .... | 1,369,510 | O |
| Norton | 2,593,574 | * | * | O, P |
| Osage | 30,784 | 315,342 | 346,126 | St, Co |
| Osborne | 239,401 | * | * | O, SG |
| Ottawa | .... | * | * | SG |
| Pawnee | 10,125,955 | 83,107 | 10,209,062 | O, G, SG |
| Phillips | 5,194,609 | .... | 5,194,609 | O |
| Pottawatomie | .... | 169,740 | 169,740 | St, SG |
| Pratt | 7,939,952 | 105,323 | 8,045,275 | O, G, SG |
| Rawlins | 2,549 | .... | 2,549 | O |
| Reno | 3,553,224 | 6,072,741 | 9,785,137 | S, O, LP, SG, NG |
| Republic | .... | 68,427 | 68,427 | SG |
| Rice | 15,231,296 | 2,066,695 | 17,299,991 | O, S, SG, St, G |
| Riley | .... | 160,449 | 160,449 | St, SG |
| Rooks | 19,708,137 | .... | 19,708,137 | O |
| Rush | 3,044,145 | .... | 3,044,145 | O, H, G, NG, LP |

| County | Value of mineral production | | | Commodities ^b in order of decreasing importance |
|---------------|-----------------------------|---------------|---------------|------------------------------------------------------------|
| | Fuels ^a | Nonfuels | Total | |
| Russell | 27,872,759 | * | * | O, SG, G |
| Saline | 2,289,372 | 310,360 | 2,599,732 | O, SG |
| Scott | 169,079 | * | * | O, SG |
| Sedgwick | 9,452,724 | 2,074,655 | 11,527,379 | O, SG, NG, B, LP, V, G |
| Seward | 5,557,097 | .... | 5,557,097 | G, NG, LP, O |
| Shawnee | .... | 1,078,084 | 1,078,084 | St, SG |
| Sheridan | 1,133,632 | 38,984 | 1,172,616 | G, SG |
| Sherman | .... | 44,972 | 44,972 | SG |
| Smith | .... | * | * | SG |
| Stafford | 17,693,801 | * | * | O, G, SG |
| Stanton | 1,862,997 | * | * | G, SG, O |
| Stevens | 11,235,382 | .... | 11,235,382 | G |
| Sumner | 8,882,532 | * | * | O, G, SG |
| Thomas | 30,340 | 39,415 | 69,755 | SG, O |
| Trego | 4,145,321 | * | * | O, SG |
| Wabaunsee | 913,123 | * | * | O, SG |
| Wallace | .... | * | * | Dm, SG |
| Washington | .... | 63,950 | 63,950 | SG |
| Wichita | .... | * | * | SG |
| Wilson | 518,213 | 5,616,929 | 6,135,142 | C, St, O, Cl, G |
| Woodson | 2,838,629 | .... | 2,838,629 | O, G |
| Wyandotte | 186 | 9,386,807 | 9,386,993 | C, St, SG, Pe, Cl, G |
| Unassigned | 175,161 | 10,512,047 | 10,687,208 | Cl prod., Fuels, SG, St |
| Undistributed | .... | 2,339,816 | .... | .... |
| Kansas total | \$432,011,725 | \$ 82,858,452 | \$514,870,177 | .... |

* Undistributed values may not be revealed.

^a In assigning values of minerals produced in each county, the value of oil (fuels column) was computed on the average price of \$2.82 per barrel (Table 1), even though it is realized that the price of oil varies with the gravity of oil produced and that therefore the actual value of oil in any one county may be greater or less than that computed on the \$2.82 per barrel basis. Likewise, the new minimum price of 11 cents per 1000 cubic feet of natural gas measured at 14.65 psia (pounds per square inch absolute) established by the Kansas Corporation Commission for the Hugoton Gas Area has been applied to all Kansas gas production, including minor amounts of unprorated production, much of which probably brought a higher price.

^b Commodities: B, brine; C, cement; CB, carbon black; Cl, clay; Co, coal; Dm, diatomaceous marl; G, natural gas; Gp, gypsum; H, helium; LP, liquefied petroleum gases; NC, natural cement; NG, natural gasoline; O, oil; P, pumicite (volcanic ash); Pb, lead; Pe, perlite; S, salt; SG, sand and gravel; St, stone; V, vermiculite; Zn, zinc.

Sources of information—In compiling the information for this report, many of the data were obtained from the tabulation sheets provided by the United States Bureau of Mines, with which the State Geological Survey of Kansas has been cooperating for many years in collecting mineral statistics for the state. Coal statistics were derived from the reports of Mr. John Delplace, Chief Mine Inspector of the Mine Inspection Section and Mine Rescue Station of the Kansas Labor Department at Pittsburg, Kansas. Data pertaining to petroleum and related products and natural gas were summarized from the reports by Goebel and others on Oil

and Gas Developments in Kansas published as State Geological Survey Bulletins 122 and 128. Many of the data on oil and gas production in these bulletins were supplied by the Kansas Corporation Commission, Conservation Division. Other data (regarding expansions, modernization, and the organization of new mineral producing companies) were obtained from the *Kansas Business Midwest Industry Magazine* and *To The Stars*, the latter a publication of the Kansas Industrial Development Commission, Topeka, Kansas.

THE MINERAL FUELS AND RELATED PRODUCTS

Continuing the trend of former years, the mineral fuels, coal, oil, natural gas, the natural gas liquids, and related products (helium and carbon black) contributed the greatest share to the mineral wealth produced in Kansas in 1956. In that year they accounted for 83.9 per cent of the total value of minerals produced, or \$432,011,725 (Table 4, Fig. 3).

COAL

Kansas in 1956 produced 876,006 short tons of bituminous coal, or 126,920 tons more than it did in 1955, a gain of 18.5 percent. Of the total quantity of coal mined in the state, 862,858 tons, or 98.5 percent, were mined by stripping, and only 13,148 tons, or 1.5 percent, were produced from shaft mines. Coal, 11th in impor-

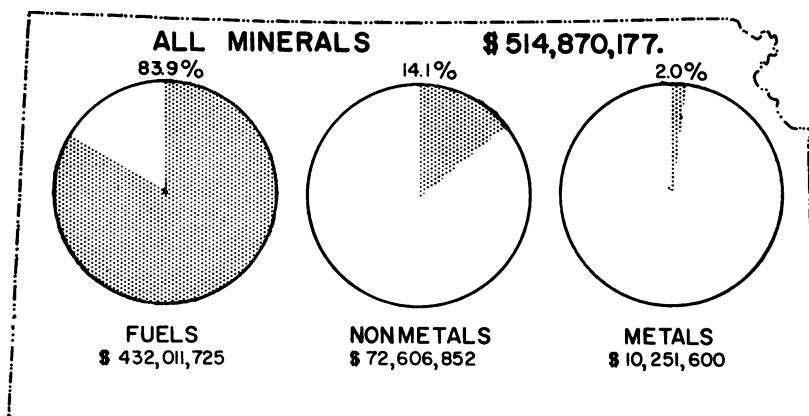


FIG. 3.—Percent and value of mineral production in Kansas, 1956.

tance among the Kansas mineral commodities produced in 1956, was valued at \$4,003,500, or 28.4 percent more than it was in 1955, when the state coal was worth \$3,118,942. In 1956 the estimated average price of coal per ton was \$4.57; in 1955 it was on the average \$4.22.

Of the 8 coal-producing counties, Crawford and Coffey showed increases in production, whereas Bourbon, Cherokee, Franklin, Labette, Linn, and Osage Counties each produced less coal than in the previous year. Greatest gain in production was made by Crawford County, which in 1956 produced 177,187 tons more than it did in 1955, a gain of 143.0 percent. Coffey County's production increased by 565 tons, or by 26 percent. Greatest decline in coal production in 1956 was by Labette County, whose loss amounted to 55 percent. Franklin County produced 38 percent less coal in 1956 than it did in the previous year. Other losses were Bourbon County with 33 percent, Osage with 28 percent, Linn County with 13 percent, and Cherokee County with 5 percent. There were also 7 fewer mines producing coal in 1956 than in 1955. Cherokee County as in 1955 ranked first in coal production in 1956.

With the exception of Bourbon County, which changed places in rank with Osage County from 3rd to 4th place, all counties maintained their rank as in the year before. Table 5 gives figures on Kansas coal production by type of mine and by counties, value of coal, rank of counties, and number of mines in 1955 and 1956.

The Pittsburg-Midway Coal Company operating in Cherokee County outranked all others of the 31 coal companies mining coal in the state. In 1956 this company produced 11,678 more tons of coal than in 1955, or a total of 496,292 tons of strip coal, equivalent to 56.6 percent of all coal mined in Kansas. Second in importance in the coal mining industry of Kansas in 1956 was the Clemens Coal Company of Crawford County with a production of 183,007 tons of coal. The Apex-Compton Coal Company operating one strip mine in Cherokee County and one strip mine in Crawford County produced 83,962 tons of coal in 1956. These 3 companies produced a total of 763,261 tons, or 87.1 percent of all coal mined in the state. Of the 4 coal companies producing drift or shaft mining coal the Lucky Star Coal Company of Crawford County with a production of 5,115 tons ranked first in output of this type of coal.

Measured and indicated coal reserves in Kansas to the end of

TABLE 4—Value of minerals produced in Kansas in 1955 and 1956

| Year | Mineral fuels and associated products | Percent of total | Nonmetals (excluding mineral fuels) | Percent of total | Metals | Percent of total | All minerals | Percent change from 1955 |
|------|---------------------------------------|------------------|-------------------------------------|------------------|--------------|------------------|---------------|--------------------------|
| 1955 | \$414,342,840 | 84.9 | \$65,120,945 | 13.3 | \$ 8,432,909 | 1.8 | \$487,896,694 | |
| 1956 | \$432,011,725 | 83.9 | \$72,606,852 | 14.1 | \$10,251,600 | 2.0 | \$514,870,177 | +5.5 |

TABLE 5—Kansas coal production by type of mine and by counties, value of coal, rank by counties, and number of mines, 1955 and 1956

| County | 1955 | | 1956 | | Value | 1956 | | Value | Rank | | |
|--------------------------|-------------------|------------------|-------------------|------------------|-------------|-------------------|------------------|-------------|------|------|------------|
| | Production, Strip | short tons, Deep | Production, Strip | short tons, Deep | | Production, Strip | short tons, Deep | | 1955 | 1956 | Strip Deep |
| Bourbon | 9,841 | ... | 9,841 | ... | \$ 41,529 | 6,511 | ... | \$ 29,755 | 3 | 4 | 3 0 |
| Cherokee | 591,251 | ... | 591,251 | ... | 2,495,079 | 557,489 | ... | 2,547,725 | 1 | 1 | 6 0 |
| Coffey | 2,147 | ... | 2,147 | ... | 9,060 | 2,712 | ... | 12,394 | 5 | 5 | 2 0 |
| Crawford | 115,455 | 8,433 | 123,888 | 7,128 | 522,807 | 293,947 | 301,075 | 1,375,913 | 2 | 2 | 11 2 |
| Franklin | ... | 1,048 | 1,048 | ... | 4,423 | ... | 647 | 2,957 | 6 | 6 | 1 0 |
| Labette | 998 | ... | 998 | ... | 4,212 | ... | 447 | 2,043 | 7 | 7 | 1 0 |
| Linn | 452 | ... | 452 | ... | 1,907 | ... | 398 | 1,778 | 8 | 8 | 1 0 |
| Osage | 4,392 | 5,069 | 9,461 | ... | 39,925 | 2,199 | 4,537 | 30,784 | 4 | 3 | 4 2 |
| All counties | 724,536 | 14,550 | 739,086 | 13,148 | \$3,118,942 | 862,858 | 876,006 | \$4,003,500 | | | 29 4 |
| Percent | 98.1 | 1.9 | 100 | 1.5 | | 98.5 | 100 | | | | |
| Percent change from 1955 | | | | -9.7 | | +19.1 | +18.5 | +28.4 | | | |

1956 are estimated at 1,117,754,000 tons, of which 838,315,500 tons are considered recoverable. On the basis of the average annual production of coal for the last 5 or 6 years sufficient recoverable coal in Kansas is available to supply the state's need for more than the next 500 years.

Coal companies operating in Kansas on record December 31, 1956, are listed in Table 6.

TABLE 6—*Directory of Kansas coal-mining companies on record as of December 31, 1956*

| County | Coal Company | Office Address |
|----------|------------------|---------------------------------|
| Bourbon | Garrett | Route 2, Garland |
| do | Pellett | Route 5, Fort Scott |
| do | Wood | Route 1, Pleasanton |
| Cherokee | Apex-Compton | P.O. Box 45, Monmouth |
| do | Black Diamond | Weir |
| do | Markley | Route 2, McCune |
| do | Pittsburg-Midway | 314 Nat'l Bank Bldg., Pittsburg |
| do | S & M | Route 1, Scammon |
| do | Wilkinson | Weir |
| Coffey | Rogers | Lebo |
| do | Thorne | P.O. Box 171, Lebo |
| Crawford | Apex-Compton | P.O. Box 45, Monmouth |
| do | Blue Ribbon | Girard |
| do | Carr | Route 1, Mulberry |
| do | Clemens | 312 Globe Bldg., Pittsburg |
| do | Davis | Cherokee |
| do | Gobl | Route 1, Mulberry |
| do | Jones | Arcadia |
| do | Lucky Star | 2024 S. Broadway, Pittsburg |
| do | Mark | Route 1, Mulberry |
| do | N Coal Co. | 1010 S. Catalpa, Pittsburg |
| do | Palmer & Son | Mulberry |
| do | Wilson | 402 W. 20th, Pittsburg |
| Franklin | Red Star | Homewood |
| Labette | Gallagher | P.O. Box 65, Oswego |
| Linn | Fyock | Prescott |
| Osage | Bell | Burlingame |
| do | Central | Burlingame |
| do | Johnson | Scranton |
| do | Linville & Sons | P.O. Box 266, Carbondale |
| do | New | Burlingame |
| do | Osage | Osage City |

OIL

Kansas, fifth ranking oil state in the nation, produced 124,467,-713 barrels of crude oil, or petroleum, valued at \$350,998,951 in 1956, an increase of 3,306,479 barrels of oil and \$9,324,271 in value when compared to production and value of 1955, a 2.7 percent

TABLE 7.—*Petroleum or crude oil production in Kansas, 1955 and 1956*

| Year | Production bbl. | Value | Price per bbl. | Percent change from previous year | |
|------------|--------------------|---------------|-------------------|--------------------------------------|-------|
| | | | | Quantity | Value |
| 1955 | 121,161,234 | \$341,674,680 | \$2.82 | | |
| 1956 | 124,467,713 | \$350,998,951 | \$2.82 | +2.7 | +2.7 |

gain in quantity and value (Table 7). Among the mineral commodities produced in the state oil is foremost. The average price of crude oil in 1956 was \$2.82 per barrel, the same as in the previous year.

The number of oil-producing counties in the state actually reporting production was 75, or 4 more than in the previous year. Rawlins County was added to the list of Kansas oil-producing counties for the first time. Among the 10 leading oil-producing counties several changes are to be noted (Table 8). Greenwood

TABLE 8.—*Ten leading oil-producing counties in Kansas, 1955 and 1956*

| County | Production, bbl. | | Rank | |
|-----------------|------------------|------------|------|------|
| | 1955 | 1956 | 1955 | 1956 |
| Barton | 14,366,110 | 14,413,934 | 1 | 1 |
| Ellis | 11,165,885 | 11,618,360 | 2 | 2 |
| Russell | 10,772,297 | 9,883,069 | 3 | 3 |
| Butler | 8,469,378 | 8,138,153 | 4 | 4 |
| Rooks | 7,112,975 | 6,988,701 | 5 | 5 |
| Greenwood | 6,485,392 | 6,788,601 | 8 | 6 |
| Stafford | 6,564,369 | 6,231,825 | 7 | 7 |
| Graham | 4,897,852 | 6,040,225 | 9 | 8 |
| Rice | 6,802,665 | 5,369,801 | 6 | 9 |
| Cowley | 4,712,727 | 4,595,480 | 10 | 10 |

County, which in 1955 ranked eighth in oil production, advanced to sixth place; Rice county, sixth in 1955, dropped to ninth place; and Graham County, rated ninth in 1955, became the eighth most important oil-producing county in 1956. With the exception of Barton, Greenwood, and Graham Counties, all of the other 10 leading oil-producing counties showed losses in the annual quantity of oil produced in 1956 when compared to 1955. Fourteen counties (Table 9) have each produced a cumulative quantity of 50 or more million barrels of oil since production first started. Of these counties, Butler, an eastern Kansas county, rates first with 413,813,291 barrels of oil, or 117,897,202 more barrels of oil than

TABLE 9.—*Leading oil-producing counties in Kansas based upon recorded and estimated cumulative production (50 million barrels or more) to the end of 1956*

| County | Cumulative production, bbl. | | Rank | |
|-----------------|-----------------------------|-------------|------|------|
| | 1955 | 1956 | 1955 | 1956 |
| Butler | 405,675,138 | 413,813,291 | 1 | 1 |
| Barton | 281,505,782 | 295,916,089 | 2 | 2 |
| Russell | 268,884,089 | 279,226,050 | 3 | 3 |
| Rice | 205,146,553 | 210,515,444 | 4 | 4 |
| Greenwood | 202,809,092 | 209,597,693 | 5 | 5 |
| Ellis | 180,904,523 | 192,577,302 | 6 | 6 |
| McPherson | 132,467,644 | 136,435,169 | 7 | 7 |
| Stafford | 96,600,930 | 120,908,569 | 8 | 8 |
| Cowley | 83,537,780 | 88,134,198 | 10 | 9 |
| Ellsworth | 84,072,280 | 87,062,334 | 9 | 10 |
| Rooks | 60,081,180* | 67,069,840 | 12 | 11 |
| Sumner | 61,045,695** | 64,090,567 | 11 | 12 |
| Sedgwick | 58,600,750 | 61,324,314 | 14 | 13 |
| Reno | 60,011,556* | 61,137,234 | 13 | 14 |

* Revised figures.
** Omitted in 1955 report.

second place Barton County and 134,587,241 more barrels of oil than Russell County, third in rank.

Since records of oil production in the state have been kept, Kansas has produced to the end of 1956 a recorded cumulative total of 2,766,885,000 barrels of crude oil valued approximately at \$5,252,000,000.

Most of the larger oil fields are in western Kansas (Table 10). Of the 6 major oil fields only the El Dorado field in Butler County lies east of the Sixth Principal Meridian, which is the division line between Eastern and Western Kansas insofar as oil and gas are concerned. In 1956 the El Dorado field surpassed the Trapp field in Russell and Barton Counties for the topmost oil-producing field in the state. The other leading oil fields, the Kraft-Prusa in Barton and Ellsworth Counties, the Hall-Gurney in Russell and Barton Counties, the Chase-Silica in Rice, Barton, and Stafford Counties,

TABLE 10.—*Leading oil fields in Kansas, 1955 and 1956*

| Field, by 1956 rank | County | Annual production barrels | |
|---------------------|------------------------------|---------------------------|-----------|
| | | 1955 | 1956 |
| El Dorado | Butler | 4,231,941 | 4,358,743 |
| Trapp | Russell-Barton | 4,797,347 | 4,241,489 |
| Kraft-Prusa | Barton-Ellsworth | 4,096,114 | 3,712,488 |
| Hall-Gurney | Russell Barton | 4,075,710 | 3,598,344 |
| Chase-Silica | Rice, Barton, Stafford | 3,282,046 | 3,482,134 |
| Bemis-Shutts | Ellis | 3,232,150 | 3,055,079 |

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and Bemis-Shutts in Ellis County maintained their rank as in 1955. Production of these large oil fields for the years 1955 and 1956 is listed in Table 10.

Paralleling the annual increase in oil production in Kansas is the consumption of oil within the state. In 1956 Kansas consumed 80.4 percent of its production, or 3.5 percent more than in 1955, when 76.9 percent of the oil produced was consumed. Imports and exports of oil from and to other states were increasing in 1956. In 1955 Kansas imported 29,505,340 barrels of crude oil, whereas in 1956 the imports amounted to 34,320,108 barrels, an increase of 16.3 percent. Exports in 1956 were 58,713,375 barrels, an increase of 1,185,874 barrels over the previous year, or a gain of 2 percent. Total quantity of oil accounted for in 1956 was 158,787,821 barrels of oil compared to 150,666,574 barrels of oil in 1955. Data on production, consumption, imports and exports, and total quantity of oil accounted for in 1955 and 1956 are listed in Table 11.

TABLE 11.—*Production, consumption, imports, and exports of crude oil in Kansas, 1955 and 1956*

| Year | Production bbl. | Quantity bbl. | Consumption Percent of production | Imports bbl. | Exports bbl. | Total Quantity production & imports, bbl. |
|-----------|--------------------|------------------|-----------------------------------------|-----------------|-----------------|-------------------------------------------------|
| 1955 | 121,161,234 | 93,139,073 | 76.9 | 29,505,340 | 57,527,501 | 150,666,574 |
| 1956 | 124,467,713 | 100,074,446 | 80.4 | 34,320,108 | 58,713,375 | 158,787,821 |

Even though oil production and consumption are increasing in Kansas, the proved oil reserves are steadily increasing or holding their own primarily because of discovery of new oil pools and secondarily because of the revival of old fields. In 1956, 138 new oil fields were discovered, 3 of which produced both oil and gas (Table 12). In addition 5 abandoned oil fields were revived. Proved oil reserves in 1956 were estimated at 992.2 million barrels, approximately the same as in 1955, when the oil reserves were estimated at 998.1 million barrels (Table 13). Counties in which new oil fields were discovered in 1956 are those listed in Table 12.

Changes in 1956 in the oil industry are the following. Derby Refining Company, Wichita, Sedgwick County, completed its Ultraformer platinum catalyst refining unit, the first unit of this type in the state. Their \$1,250,000 expansion program also included a newly designed crude oil unit having a 20,000 barrel per day capacity, a new 12 foot diameter vacuum unit, and a 20,000

198 *Geological Survey of Kansas—1957 Reports of Studies***TABLE 12.—Counties and number of oil and gas fields discovered and number of revived fields in each in Kansas in 1956**

| County | Number of fields discovered | | | | Revived |
|------------------|-----------------------------|-----|------|-------|---------|
| | Oil | Gas | O.G. | Total | |
| Barber | 2 | 12 | | 14 | |
| Barton | 9 | | | 9 | |
| Butler | 2 | | | 2 | |
| Chautauqua | 1 | 1 | | 2 | |
| Clark | 1 | | | 1 | |
| Coffey | | 1 | | 1 | |
| Comanche | | 1 | | 1 | |
| Cowley | 10 | | 1 | 11 | 1 |
| Decatur | 3 | | | 3 | |
| Dickinson | 1 | | | 1 | |
| Edwards | 4 | 1 | | 5 | |
| Elk | 1 | 1 | | 2 | 1* |
| Ellis | 19 | | | 19 | 3 |
| Ellsworth | 1 | | | 1 | |
| Finney | 2 | | | 2 | |
| Ford | 1 | | | 1 | |
| Graham | 4 | | | 4 | |
| Greenwood | 1 | | | 1 | |
| Harper | 2 | | | 2 | |
| Harvey | 1 | 1 | | 2 | |
| Hodgman | 2 | | | 2 | |
| Kearny | 1 | | | 1 | |
| Kingman | | 2 | | 2 | |
| Kiowa | | 4 | | 4 | |
| McPherson | 2 | | | 2 | |
| Marion | 6 | | | 6 | |
| Meade | 1 | 4 | 1 | 6 | |
| Morris | 1 | | | 1 | |
| Ness | 4 | | | 4 | |
| Pawnee | 3 | 1 | | 4 | |
| Pratt | 2 | | 1 | 3 | |
| Rawlins | 1 | | | 1 | |
| Rice | 2 | 1 | | 3 | |
| Rooks | 5 | | | 5 | |
| Rush | 3 | 1 | | 4 | |
| Russell | 3 | | | 3 | |
| Sedgwick | 5 | | | 5 | |
| Seward | | 1 | | 1 | |
| Sheridan | 2 | | | 2 | |
| Stafford | 11 | 1 | | 12 | |
| Stevens | | 2 | | 2 | |
| Sumner | 4 | | | 4 | 1 |
| Thomas | 1 | | | 1 | |
| Trego | 6 | | | 6 | |
| Wallace | | 1 | | 1 | |
| Woodson | 2 | 1 | | 3 | |
| Total | 132 | 37 | 3 | 172 | 6 |

* Gas, all other oil fields.

TABLE 13.—Crude oil reserves and oil fields discovered and revived in Kansas, 1955 and 1956
(American Petroleum Institute, 1955 and 1956)

| Year | Million bbl. | Percent change from 1955 | Oil fields discovered | Oil fields revived | Total |
|------------|-----------------|-----------------------------|--------------------------|-----------------------|-------|
| 1955 | 998.1 | | 124 ^a | 9 | 133 |
| 1956 | 992.2 | —0.6 | 138 ^b | 5 | 143 |

^a Six fields produced both oil and gas.

^b Three fields produced both oil and gas.

gallon oxidizing kettle installed to produce high quality paving asphalt. Refining storage capacity was also increased by the addition of two new 55,000 gallon products tanks and a 78,000 gallon crude oil tank. Vickers Petroleum Company, Inc., started construction of a new million dollar 3,500 barrel per day Ultraformer, and Phillips Petroleum Company put into operation its new 16,000 barrel per day catalytic reforming unit at its Kansas City refinery.

Socony Mobil Oil Company, Inc., is planning a 9,000 barrel per day catalytic reforming unit for its refinery at Augusta, Butler County, to be completed by August 1957. Anderson-Prichard Oil Corporation started increasing the atmospheric distillation capacity of its Arkansas City, Cowley County, refinery by 6,500 barrels per day and its asphalt production from 1000 to 1250 barrels per day. A 3,000-barrel per day propane deasphalting unit is planned for completion late in 1957. In January the Mid-America Refining Company, Inc., a recently organized corporation, purchased the Missouri Farmers Association Refinery at Chanute, Neosho County.

Many major oil companies operate in Kansas, as do numerous independent oil companies and operators whose number changes from year to year. For this reason no directory of oil companies is included in this report.*

A directory of refineries is given in Table 14, because the number of oil refineries is less variable than the number of oil companies.

NATURAL GAS

Nationwide, Kansas ranks fifth as a producer of natural gas, second most valuable mineral produced in the state. In 1956 Kansas produced 525,931,757 thousand cubic feet of natural gas valued at \$57,852,493, or 12.8 percent more in both quantity and value

* For the names of oil companies, independent operators, and consulting geologists, see the Kansas Geological Society Directory published by the Society at 508 East Murdock Street, Wichita 5, Kansas, and Morrison Petroleum Directory of Kansas published annually by John H. Morrison, Box 191, Wichita, Kansas.

than it did in 1955, when 466,180,157 thousand cubic feet of gas valued at \$51,279,817 were produced (Table 15). Cumulative natural gas production in Kansas from the first recorded production to the close of 1956 is estimated at 4,415,966,904 thousand cubic feet.

Of the total amount of gas produced in 1956 in the state, 72.6 percent, or 381,874,779 thousand cubic feet, came from the Hugo-

TABLE 14.—*Directory of petroleum refineries in Kansas as of December 31, 1956*

| Refinery | Office Address | County |
|---------------------------------------------|-----------------------------------------|------------|
| Anderson-Prichard Oil Corp. | Arkansas City | Cowley |
| Century Refining Company, Inc. ^a | 114 W. Pine, Garden City | Finney |
| Chanute Refining Company | P.O. Box 431, Chanute | Neosho |
| Cooperative Refinery Assn. | Coffeyville | Montgomery |
| Cooperative Refinery Assn. | P.O. Box 570, Phillipsburg | Phillips |
| Derby Oil Company | 420 W. Douglas, Wichita | Sedgwick |
| El Dorado Refining Company | P.O. Box 551, El Dorado | Butler |
| Mid-America Refining Company, Inc. | Chanute | Neosho |
| National Cooperative Refinery Assn. | P.O. Box 770, McPherson | McPherson |
| Phillips Petroleum Company | 2029 Fairfax Trafficway, Kansas City | Wyandotte |
| Skelly Oil Company | 1401 S. Douglas Road, El Dorado | Butler |
| Socony Mobil Oil Company, Inc. | P.O. Box 546, Augusta | Butler |
| Standard Oil Company (Indiana) | 1101 Illinois, Neodesha | Wilson |
| Vickers Petroleum Company, Inc. | Wichita ^b | Sedgwick |

^a Successor to Shallow Water Refining Company. Refinery at Shallow Water, Scott County.

^b Refinery at Potwin, Butler County.

ton Gas Area comprising all or part of Finney, Grant, Hamilton, Haskell, Kearny, Morton, Seward, Stanton, and Stevens Counties, all of which are in southwestern Kansas (Table 16). Natural gas was produced in 47 counties in 1956, one fewer than in 1955. Seventeen counties instead of thirteen as in 1955 (Table 17) produced 2 billion cubic feet of gas or more in 1956. New counties added to the 2 billion or more cubic feet of gas category include

TABLE 15.—*Natural gas production in Kansas, 1955 and 1956*

| Year | Production M cu. ft. (14.65 psia) | Value | Price, cents per cu. ft. | Percent change from previous year | |
|------------|-----------------------------------------|--------------|-----------------------------|--------------------------------------|-------|
| | | | | Quantity | Value |
| 1955 | 466,180,157 | \$51,279,817 | 11 | | |
| 1956 | 525,931,757 | \$57,852,493 | 11 | +12.8 | +12.8 |

TABLE 16.—*Production of natural gas in the Hugoton Gas Area, Kansas, 1955 and 1956*

| Year | Production M cu. ft. (14.65 psia) | Value | Percent change | | Percent of state total production |
|------------|-----------------------------------------|--------------|----------------|-------|--------------------------------------|
| | | | Quantity | Value | |
| 1955 | 394,247,153 | \$43,368,287 | | | 84.6 |
| 1956 | 381,874,779 | \$42,006,226 | —3.2 | —3.2 | 72.6 |

Kingman, 11th in rank; Sumner, 14th; Harper, 15th; and Kiowa, 17th. Of these 17 leading gas producers, Stevens with 102,139,834 thousand cubic feet of gas was easily foremost. Grant, Morton, and Kearny maintained second, third, and fourth positions as in the previous year. Barber County, which in 1955 was the ninth of the leading gas producers, advanced to fifth place in 1956. Other changes in order of rank as leading gas producers in 1956 when compared to 1955 are listed in Table 18. Of the 13 leading gas counties of 1955, 7 produced less gas in 1956 than in 1955. Of those showing gains Barber and Meade lead the list of 6. On the basis of cumulative production of natural gas of 10 or more billion cubic feet of gas to the end of 1956, 2 counties, Kingman and Stafford, were added to the list of the fifteen counties constituting the list for 1955 (Table 18). Several interchanges in rank are to be noted. Barber County, sixth in 1955, became fifth in 1956; Haskell, fifth in

TABLE 17.—*Production of natural gas in Kansas counties producing 2 billion cubic feet or more annually, 1955 and 1956*

| County | Production M cu. ft. (14.65 psia) | | Rank | |
|------------------------------|--------------------------------------|-------------|------|------|
| | 1955 | 1956 | 1955 | 1956 |
| Stevens ^a | 109,053,705 | 102,139,834 | 1 | 1 |
| Grant ^a | 84,485,345 | 77,166,752 | 2 | 2 |
| Morton ^{a, b} | 60,040,584 | 73,484,852 | 3 | 3 |
| Kearny ^a | 59,523,103 | 63,479,195 | 4 | 4 |
| Barber | 12,419,721 | 50,113,968 | 9 | 5 |
| Finney ^a | 34,013,718 | 38,048,847 | 5 | 6 |
| Haskell ^a | 32,768,432 | 31,391,477 | 6 | 7 |
| Seward ^{a, b} | 30,294,960 | 29,925,323 | 7 | 8 |
| Stanton ^a | 15,438,885 | 16,916,185 | 8 | 9 |
| Meade | 2,718,061 | 7,386,699 | 12 | 10 |
| Kingman | | 6,860,788 | .... | 11 |
| Pawnee | 4,774,478 | 4,608,215 | 11 | 12 |
| Hamilton ^a | 5,196,385 | 4,297,064 | 10 | 13 |
| Sumner | | 2,690,841 | .... | 14 |
| Harper | | 2,590,594 | .... | 15 |
| Rush | 2,694,780 | 2,548,288 | 13 | 16 |
| Kiowa | | 2,397,523 | .... | 17 |

^a Hugoton Gas Area counties.

^b Not all gas produced in Morton and Seward Counties is from the Hugoton Gas Area.

TABLE 18.—Leading gas producing counties in Kansas based on estimated and recorded cumulative production of 10 or more billion cu. ft. of gas to end of 1956

| County | Cumulative production M cu. ft. (14.65 psia) | Rank | |
|------------------------------|-------------------------------------------------|------|------|
| | | 1955 | 1956 |
| Stevens ^a | 1,478,766,620 | 1 | 1 |
| Grant ^a | 774,393,100 | 2 | 2 |
| Kearny ^a | 531,032,728 | 3 | 3 |
| Morton ^{a, b} | 341,792,167 | 4 | 4 |
| Barber | 292,009,987 | 6 | 5 |
| Haskell ^a | 282,539,659 | 5 | 6 |
| Finney ^a | 252,005,453 | 7 | 7 |
| Seward ^{a, b} | 213,136,494 | 8 | 8 |
| Stanton ^a | 107,225,514 | 9 | 9 |
| Rice | 33,375,547 | 10 | 10 |
| Pawnee | 31,842,623 | 11 | 11 |
| Barton | 22,375,314 | 12 | 12 |
| Hamilton ^a | 22,279,381 | 13 | 13 |
| Meade | 17,452,265 | 15 | 14 |
| Pratt | 17,339,802 | 14 | 15 |
| Kingman | 13,656,345 | | 16 |
| Stafford | 10,983,950 | | 17 |

^a Hugoton Gas Area counties.^b Not all gas produced in Morton and Seward Counties is from the Hugoton Gas Area.

1955, was sixth in 1956; Meade, 15th in 1955, advanced to 14th in 1956; and Pratt dropped from 14th in 1955 to 15th in 1956. Table 18 shows the cumulative gas production and rank of the leading Kansas counties.

The reserves of natural gas, like those of oil, increased in 1956, owing to the continued discovery of new gas fields. In 1956, 38 new fields were discovered, 3 of which produced both gas and oil. In addition 2 abandoned gas fields were revived during the year. In 1955 Kansas was credited with 31 newly discovered gas fields and 1 revived field. Natural gas reserves in 1956 are estimated at 17,566,257 million cubic feet, or 7.8 percent more than in 1955, when 16,293,080 million cubic feet of gas constituted the quantity of natural gas in reserve in the state (Table 19).

TABLE 19.—Natural gas reserves and gas fields discovered and revived in Kansas, 1955 and 1956
(American Gas Association, 1955 and 1956)

| Year | Million cu. ft. | Percent change from previous year | Gas fields discovered | Gas fields revived | Total |
|------------|--------------------|-----------------------------------------|--------------------------|-----------------------|-------|
| 1955 | 16,293,080 | | 31 ^a | 1 | 32 |
| 1956 | 17,566,257 | +7.8 | 38 ^b | 1 | 39 |

^a Six fields produced both gas and oil.^b Three fields produced both gas and oil.

The Panhandle Eastern Pipeline Company started building 2 natural gas dehydration plants in Morton County and also 19 miles of new 24-inch pipeline from the southern part of Morton County to Hugoton. In addition the company built 2 new 2000-horsepower booster stations, one 2 miles northwest of Elkhart, the other 6 miles south of Rolla, both in Morton County.

NATURAL GAS LIQUIDS

Production and value of natural gas liquids, consisting of natural gasoline, propane, butane, and other miscellaneous liquefied gases, decreased by 3.7 and 1.6 percent respectively in 1956 over 1955. In 1955 the total quantity of natural gas liquids amounted to 4,919,550 barrels valued at \$12,052,898, whereas in 1956 production was 4,747,247 barrels worth \$11,868,823 (Table 20). With the exception of propane, all others showed decreased

TABLE 20.—*Production and value of liquefied petroleum gas (LPG) in Kansas in 1955 and 1956*

| | 1955 | | 1956 | |
|-----------------------------------|----------------|--------------------|----------------|--------------------|
| | Quantity, bbl. | Value ^a | Quantity, bbl. | Value ^b |
| Natural gasoline | 2,724,569 | \$ 6,675,194 | 2,550,686 | \$ 6,376,715 |
| Propane | 950,858 | 2,329,602 | 1,128,619 | 2,821,548 |
| Butane | 967,635 | 2,370,706 | 791,832 | 1,979,580 |
| Other LPG | 276,488 | 677,396 | 276,110 | 690,980 |
| All liquid hydrocarbons | 4,919,550 | \$12,052,898 | 4,747,247 | \$11,868,823 |
| Percent change from 1955 | | | —3.7 | —1.6 |

^a Estimated average price \$2.45 per barrel.

^b Estimated average price \$2.50 per barrel.

production in 1956, and propane and other LPG were the only two whose value was more than it was in 1955. The estimated average price per barrel of all natural gas liquids in 1956 was \$2.58, or 5 cents more than in 1955.

Proved reserves of natural gas liquids declined by less than 1 percent (0.9) in 1956 when compared to those of 1955. In 1956 Kansas' proved natural gas liquid reserves totaled 171.6 million barrels, and in the previous year 173.2 million barrels.

Natural gasoline and liquefied petroleum gases were procured by 14 companies in 16 plants located in 12 counties. Magnolia Petroleum Company started a new natural gasoline plant in the Spivey-Grabs field of Harper and Kingman Counties. This plant,

expected to be completed early in 1957, will process 40 million cubic feet of gas per day and will produce 21,000 gallons of natural gasoline and 26,000 gallons of butane and propane per day. Plants on record as of December 31, 1956, are listed in Table 21.

TABLE 21.—*Directory of Kansas plants producing natural gasoline and liquefied petroleum gas on record as of December 31, 1956*

| Plant location | | |
|----------------|----------------|-------------------------------------|
| County | Town | Company |
| Barber | Medicine Lodge | Kansas Power & Light Company |
| Cowley | Atlanta | The Texas Company |
| Finney | Holcomb | Northern Natural Gas Company |
| Grant | Ulysses | Hugoton Production Company |
| do | do | Magnolia Petroleum Company |
| do | do | Stanolind Oil and Gas Company |
| Haskell | Sublette | Northern Natural Gas Company |
| Kearny | Lakin | Colorado Interstate Gas Company |
| do | Deerfield | Kansas-Nebraska Natural Gas Company |
| Kingman | Cunningham | Skelly Oil Company |
| Reno | Burrton | Cities Service Oil Company |
| Rush | Otis | Dunn-Mar Oil and Gas Company |
| Sedgwick | Wichita | Cities Service Oil Company |
| do | Cheney | Drillers Gas Company |
| Seward | Liberal | Panhandle Eastern Pipe Line Company |

HELIUM

In 1956 Kansas produced 45,035,200 cubic feet of helium valued at \$698,000. In quantity and in value the helium produced in the state amounted to gains of 5.3 percent when compared to production and value in 1955 (Table 22). In value helium ranks 18th in the state. The production and price are controlled by the Federal Government. In addition to Federal agencies, such as the Army, Navy, Air Force, and Weather Bureau, which purchase and use most of the helium produced, other customers of the United States Bureau of Mines, which sells the helium, include commercial concerns that distribute the gas for use in arc welding, the practice of medicine, and many types of research work. Federal agencies

TABLE 22.—*Quantity and value of helium produced in Kansas, 1955 and 1956*

| Year | Quantity | | Percent change from 1955 | |
|------------|------------|-----------|--------------------------|-------|
| | cu. ft. | Value | Quantity | Value |
| 1955 | 42,749,600 | \$662,619 | | |
| 1956 | 45,035,200 | \$698,000 | +5.3 | +5.3 |

pay \$12.00 per 1,000 cubic feet of helium gas at the production plants. Other users pay \$13.50 at the plant and an additional \$2.00 per cubic foot for delivery in standard cylinders.

The helium was produced at the United States Bureau of Mines plant at Otis in Rush County. The gas is extracted from helium-bearing natural gas from more than 80 wells distributed in Barton, Pawnee, and Rush Counties. Helium-contributing gas fields include the Otis-Albert field in Rush and Barton Counties, the Ryan field in Rush and Pawnee Counties, the Pawnee Rock and Ash Creek fields in Pawnee County, and the Behrens, Unruh, Dundee, and Bergtal fields in Barton County.

CARBON BLACK

Carbon black, produced in Kansas since 1937 and used in the manufacture of rubber and as a pigment in paints and inks, was produced by 3 companies in 1956. Production in that year amounted to 105,680,834 pounds, or 8,234,679 pounds more than in the previous year, when 97,446,155 pounds were produced. The 1956 increase was 8.4 percent. In value, the 1956 quantity was 18.6 percent more than it was in 1955, the 1956 value being \$6,590,663 and the 1955 value \$5,553,883 (Table 23). Carbon black ranked ninth in value among the mineral commodities produced in the state.

TABLE 23.—*Quantity and value of carbon black produced in Kansas, 1955 and 1956*

| Year | Quantity, lb. | Value | Estimated gas consumed, billions of cu. ft. (cu. ft. at 14.65 psia) | | |
|------------|---------------|-------------|---------------------------------------------------------------------|-----------------------------|-------|
| | | | Pct. change from 1955 Quantity | Pct. change from 1955 Value | |
| 1955 | 97,446,155 | \$5,553,883 | | | 10.9* |
| 1956 | 105,680,834 | \$6,590,663 | +8.4 | +18.6 | |

* Goebel and others, 1956, Table 9, p. 32.

Carbon black was produced in Kansas by the Columbian Carbon Company and the Peerless Carbon Black Division, Columbian Carbon Company, 380 Madison Avenue, New York 17, New York, at Ulysses, Grant County, and by the United Carbon Company, P.O. Box 122, Satanta, Haskell County (plant at Ryus, Grant County).

NONMETALLIC MINERALS

In 1956 the value of the annual production of nonmetallic minerals—cement, clay, gypsum, pumicite (volcanic ash), salt, sand and gravel, and stone—was \$72,606,852, or 14.1 percent of the total value of all minerals produced in the state (Table 4, Fig. 3).

CEMENT
(PORTLAND AND MASONRY)

Seven cement companies operating in 6 eastern Kansas counties produced cement in the state in 1956. Six of these companies manufactured portland and masonry cement and the other, natural cement. Cement shipments excluding natural cement were 12.1 percent greater in 1956 than in 1955 and 19.6 percent more valuable. Production of portland cement in 1956 exceeded production in 1955 by 1,266,617 barrels (376 pounds each) for a total of 10,486,150 barrels, a gain of 13.7 percent. Shipments of portland cement, 10,239,578 barrels, were 12.8 percent greater in 1956 than in 1955, or 1,167,831 barrels. Owing to an average price increase per barrel of cement of 17 cents in 1956, the value of the shipped portland cement rose from \$24,520,533 in 1955 to \$29,370,845 in 1956, a gain of 19.7 percent in value. Allen County, the only county with two cement plants, led in the production and shipment of portland cement in the state followed by Montgomery and Wyandotte Counties respectively. Stocks on hand December 31, 1956, were 750,236 barrels, or 217,754 more than the year previous. The annual finished cement capacity of the 6 portland cement plants totals 11,777,000 barrels of cement.

In addition to portland cement, each of the 6 portland cement companies produced and shipped masonry cement totaling 380,893 and 358,739 barrels respectively having a value of \$1,324,928 for the shipped product. One company, the Fort Scott Hydraulic Cement Company, Fort Scott, Bourbon County, produced natural cement. Its production is included under "undistributed" minerals in Table 1. Natural cement is discussed on page 225.

Two cement companies made expansions and improvements at their plants during 1956. The Monarch Cement Co. at Humboldt in Allen County began an extensive expansion program to increase its production by 50 percent, to 2,250,000 barrels of cement

TABLE 24—*Production and shipment of portland and masonry cement in Kansas in 1955 and 1956, 376-pound barrels*

| Commodity | Production | | Shipments | | | |
|-----------------------------------|-----------------|-----------------|-----------------|--------------|-----------------|--------------|
| | 1955 Barrels | 1956 Barrels | 1955 Barrels | Value | 1956 Barrels | Value |
| Portland | 9,219,533 | 10,486,150 | 9,071,747 | \$24,520,533 | 10,239,578 | \$29,370,845 |
| Ave. price/bbl. | | | | 2.70 | | 2.87 |
| Percent change from 1955 | | | | | +12.8 | +19.7 |
| Masonry | 382,523 | 380,893 | 382,523 | 1,133,504 | 358,739 | 1,324,928 |
| Ave. price/bbl. | | | | 2.93 | | 3.69 |
| Percent change from 1955 | | | | | — .06 | +16.8 |
| Total P&M | 9,602,056 | 10,877,043 | 9,454,270 | \$25,654,037 | 10,598,317 | \$30,695,773 |
| Percent change from 1955 | | | | | +12.1 | +19.6 |

annually. The program calls for a new 450-tons-per-hour crushing plant, a single-burner flash drying chamber for shale and clay, two 10 by 15 foot raw mills, an 11 by 230 foot kiln, two 10 by 282 foot finish mills, and other equipment and buildings. The Universal Atlas Cement Co. of Independence, Montgomery County, likewise made improvements in the crushing, storage, and drying departments of their plant.

Cement is third in importance among the minerals produced in Kansas. Data pertaining to this cement are presented in Table 24.

Cement producers on record as of December 31, 1956, are listed in Table 25.

TABLE 25.—*Directory of cement producers in Kansas, 1956*

| County | Company | Office Address | Quarry | Type |
|------------------|---------------------------------------------------------|-----------------------------------------------------|------------------------|--------------------------|
| Allen | Lehigh Portland Cement Co. | Young Building 718 Hamilton St. Allentown Pa. | 'Iola | Portland & Masonry |
| Allen Bourbon | Monarch Cement Co. Fort Scott Hydraulic Cement Co | Humboldt Fort Scott | Humboldt Fort Scott | do Natural |
| Montgomery | Universal Atlas Cement Co. | 100 Park Ave. New York 17, New York | Independence | Portland & Masonry |
| Neosho | Ash Grove Lime & Portland Cement Co. | 101 W. 11th Kansas City 6, Mo. | Chanute | do |
| Wilson | Consolidated Cement Corp. | Fredonia | Fredonia | do |
| Wyandotte | Lone Star Cement Corp. | 1650 Dierks Bldg. Kansas City 6, Mo. | Bonner Springs | do |

CLAY AND SHALE

The total quantity of clay and shale produced in Kansas in 1956 was 977,099 tons valued at \$1,169,048, or approximately 27.2 percent greater tonnage and 33.9 percent greater value than in 1955 (Table 26). Kansas clay and shale produced consists of fire clay and miscellaneous clay (including shale used for cement), the former being produced in Barton, Cloud, and Crawford Counties; the latter in Allen, Cherokee, Crawford, Franklin, Leavenworth, Jewell, Montgomery, Wilson, and Wyandotte Counties. Fire clay production in 1956 when compared to that produced in 1955 increased 53.3 percent in quantity and 45.6 percent in value, whereas miscellaneous clay in the same period increased 21.1 percent in tonnage but decreased 1.1 percent in value. Clay used for cement decreased in quantity and in value in 1956 from 396,870 tons and dollars in 1955 to 388,787 tons and dollars in 1956, a loss of 2.1 percent. In 1956, 14 companies operating in 11 counties produced clay or shale. Disregarding clay used for cement, Franklin and Crawford Counties led all other counties in clay and shale production in 1956, whereas in 1955 Cloud and Wilson Counties held first and second place respectively. Kansas clay and shale is used primarily for the manufacture of brick (of which 124,003,000, or 5,296,000 more than in 1955, were produced in 1956), tile, cement, and lightweight aggregate. Raw clay and shale ranked 15th among mineral commodities produced in 1955 and fifth if clay products are included.

In the clay and shale industry several items are to be noted. The Kanopolis Brick and Tile Company at Kanopolis, Ellsworth County, a subsidiary of the Great Bend Brick and Tile Company, started full-time production on light buff and pink modular size face brick in April. The plant is built around a continuous-type

TABLE 26.—*Clay and shale sold or used by producers in Kansas, 1955 and 1956*

| Year | Brick, tile, lightweight aggregate | | Cement | | Total | | Clay and clay products |
|-----------------------------------------|---------------------------------------|-----------|---------|-----------|----------------------|-------------|---------------------------|
| | Tons | Value | Tons | Value | Tons | Value | |
| 1955 | 370,792 | \$476,146 | 396,870 | \$396,870 | 767,662 ^a | \$ 873,016 | 9,000,000 |
| 1956 | 588,312 | \$780,261 | 388,787 | \$388,787 | 977,099 | \$1,169,048 | 10,000,000 |
| Percent change from 1955 | +58.6 | +63.8 | —2.1 | —2.1 | +27.2 | +33.9 | |

^a Excluded certain clays, value of which is included with clay and clay products.

TABLE 27.—Directory of clay and shale producers in Kansas in 1956

| County | Company | Office Address | Pit Location | Type of plant* |
|-------------|--------------------------------------|--------------------------------------------------|----------------|----------------|
| Allen | Humboldt Brick & Tile Co. | P.O. Drawer 97, Humboldt | Humboldt | B |
| Allen | Lehigh Portland Cement Co. | Young Bldg., 718 Hamilton St., Allentown, Pa. | Iola | C |
| Allen | Monarch Cement Co. | Humboldt | Humboldt | C |
| Allen | United Brick & Tile Co. | 207 Pickwick Bldg., Kansas City 42, Mo. | Iola | B |
| Barton | Great Bend Brick & Tile Co. | P.O. Box 53, Great Bend | Great Bend | B |
| Barton | Kansas Brick & Tile Co. | Hoisington | Hoisington | B |
| Cherokee | United Brick & Tile Co. | 207 Pickwick Bldg., Kansas City, Mo. | Weir | B |
| Cloud | Cloud Ceramics | Concordia | Concordia | B |
| Crawford | W. S. Dickey Clay Mfg. Co. | 607-617 Commerce Trust Bldg., Kansas City 6, Mo. | Pittsburg | B |
| Franklin | Buildex, Inc. | 312 Globe Bldg., Pittsburg | Ottawa | A |
| Jewell | Ideal Cement Co. | 507 Denver Nat'l Bank Bldg., Denver, Colo. | | C |
| Leavenworth | Kansas State Penitentiary | Lansing | Lansing | M |
| Montgomery | Ludowici-Celadon Co. | 75 East Wacker Drive, Chicago 1, Illinois | Coffeyville | B |
| Montgomery | United Brick & Tile Co. | 207 Pickwick Bldg., Kansas City 42, Mo. | Coffeyville | B |
| Montgomery | Universal Atlas Cement Co. | 100 Park Ave., New York 17, N. Y. | Independence | C |
| Neosho | Ash Grove Lime & Portland Cement Co. | 101 West 11th St., Kansas City 6, Mo. | Chanute | C |
| Wilson | Acme Brick Co. | Fort Worth, Texas | Buffalo | B |
| Wilson | Consolidated Cement Corp. | Fredonia | Fredonia | C |
| Wilson | Excelsior Brick Co. | P.O. Box 32, Fredonia | Fredonia | B |
| Wyandotte | Kansas Industries, Inc. | 4001 Kaw Drive, Kansas City | Kansas City | A |
| Wyandotte | Lone Star Cement Corp. | 1650 Dierks Bldg., Kansas City 6, Mo. | Bonner Springs | C |

* A, aggregate; B, brick; C, cement; M, miscellaneous.

275 foot tunnel kiln that has a capacity of about 80,000 brick. Natural gas is used as the principal fuel, with oil on a stand-by basis. The Great Bend Brick and Tile Company at Great Bend, Barton County, has also undergone modernization in order to increase its production and make its plant more efficient. Kansas Industries, Inc., a subsidiary of Texas Industries, Inc., reopened its plant at Kansas City, Wyandotte County, and began production in June of sintered lightweight aggregate from shale. Cloud Ceramics at Concordia, Cloud County, contemplated expanding its plant by the addition of a new tunnel kiln and factory adjacent to the company's present plant site. The Pidgeon Vitrified China Company, successor to the Fort Scott Pottery Company, Bourbon County, the only dinnerware manufacturer in Kansas, shut down permanently its plant in 1956, a year after completely modernizing its plant.

Reserves of clay and shale are without limit. In central and north-central Kansas, where the most valuable clays in the state are found, reserves of strippable high-grade clays are estimated to be at least 125 billion tons.

A directory of clay and shale producers in Kansas in 1956 is given in Table 27.

SALT

Salt production in Kansas in 1956, both evaporated and rock salt, was less than it was in 1955. The total quantity produced amounted to 892,832 short tons valued at \$8,778,129, a decrease in quantity when compared to that of 1955 of 2 percent in tonnage and an increase of 4.1 percent in value (Table 28). Salt produced by the evaporating process amounted to 350,208 tons, or 11,404 tons less than in 1955, a decrease in tonnage of 3.2 percent. Rock

TABLE 28.—*Salt sold or used by producers in Kansas in 1955 and 1956 in short tons*

| Year | Evaporated salt | | Rock salt | | Total | |
|-------------------------------|-----------------|-------------|-----------|-------------|---------|-------------|
| | Tons | Value | Tons | Value | Tons | Value |
| 1955 | 361,612 | \$5,819,536 | 549,254 | \$2,612,789 | 910,866 | \$8,432,325 |
| 1956 | 350,208 | \$5,963,055 | 542,624 | \$2,815,074 | 892,832 | \$8,778,129 |
| Percent change from 1955 | —3.2 | +2.4 | —0.9 | +7.7 | —2 | +4.1 |

salt production of 542,624 tons was slightly less than 1 percent (0.9) when compared to that of the previous year. Although production declined, prices in 1956 exceeded those of 1955. Evaporated salt produced in 1956 was evaluated at \$5,963,055, or \$143,-519 more than in 1955, an increase of 2.4 percent, whereas rock salt produced in 1956 was valued at \$2,815,074 for a gain of \$202,-285, or 7.7 percent. Although tonnage of rock salt exceeded that of evaporated salt by approximately 55 percent in 1956, the value of the latter was \$3,147,981 more than that of rock salt, an amount equivalent to a 111.6 percent increase.

Salt was produced by 5 companies operating in 3 counties, Ellsworth, Reno, and Rice, with Reno County producing over one half of all Kansas salt. In addition to the regular commercial salt producing companies, the Frontier Chemical Company of Kansas, Inc., of Wichita, a division of the Union Chemical and Materials Corporation, produced its own salt from wells near Wichita in Sedgwick County for use in the manufacture of industrial inorganic chemicals. The Carey Salt Company of Hutchinson, Reno County, built a concrete storage elevator capable of holding 15,000 tons of rock salt near its salt mines during 1956.

Salt ranked sixth in value of all minerals produced in the state in 1956. Since salt production first started, Kansas has produced less than 5 million tons of salt. Salt reserves are estimated to be more than 5,000 billion tons, an amount for all practical purposes considered inexhaustible.

The 5 salt companies that operated in the state in 1956 are listed in Table 29.

TABLE 29.—*Directory of salt-producing companies in Kansas in 1956*

| County | Company | Office Address | Location of mine or well | Type of Plant |
|-----------|------------------------------------------|-------------------------------------------------------|--------------------------|------------------------|
| Ellsworth | Independent Salt Co. | 4115 Packers Ave., Chicago 9, Ill. | Kanopolis | Rock |
| Reno | The Barton Salt Co. | Hutchinson | Hutchinson | Evaporated |
| do | The Carey Salt Co. | do | do | Rock and evaporated |
| do | Morton Salt Co. | 120 S. La Salle, Chicago 3, Ill. | do | Evaporated |
| Rice | American Salt Corp. | 630 New York Life Building, Kansas City, 6, Mo. | Lyons | Evaporated and rock |
| Sedgwick | Frontier Chemical Co. of Kansas, Inc. | P.O. Box 545, Wichita | Wichita | Brine |

SAND AND GRAVEL

Sand and gravel, the seventh most important mineral commodity produced in Kansas in 1956, was obtained from 68 counties by 108 commercial operators and 48 noncommercial agencies. The total amount of sand and gravel produced in 1956 was 12,515,164 tons valued at \$8,022,312, an increase of 17.3 percent in tonnage and 16.1 percent in value when compared to quantity and value in 1955 (Table 30). The great increase in sand and gravel

TABLE 30.—*Sand and gravel sold or used by commercial and noncommercial producers in Kansas, 1955 and 1956*

| Year | Commercial | | Noncommercial | | Total sand & gravel | | Ave. price per ton |
|--------------------------------|------------|-------------|---------------|-----------|---------------------|-------------|--------------------|
| | Short tons | Value | Short tons | Value | Short tons | Value | |
| 1955 | 9,000,242 | \$6,342,242 | 1,664,744 | \$567,424 | 10,664,986 | \$6,909,666 | .65 |
| 1956 | 10,656,464 | \$7,428,877 | 1,858,700 | \$593,435 | 12,515,164 | \$8,022,312 | .64 |
| Percent change from 1955 | +18.4 | +17.1 | +11.6 | +4.5 | +17.3 | +16.1 | |

production in the state in 1956, 17.3 percent in 1956 as against 2.3 percent in 1955, is mostly due to the construction of the first Kansas turnpike, 236 miles, from Kansas City to south of Wichita. Of the total sand and gravel produced in 1956, commercial operators produced 10,656,464 tons, and noncommercial agencies 1,858,700 tons. Sedgwick and Wyandotte Counties, foremost in 1956 in sand and gravel production in the state, accounted for 4,412,066 tons of sand and gravel, or 35.2 percent of all sand and gravel produced in Kansas. Most of the sand and gravel produced was used for paving and structural purposes, followed by railroad ballast sand, engine sand, and filter sand (Tables 31 and 32). Other uses of Kansas sand include blast, glass, and moulding sands.

Sand and gravel producers that operated in 1956 are listed in Table 33.

Sand and gravel reserves are considered inexhaustible, because the demand for sand and gravel is so insignificant when compared to the actual quantity of these deposits that are available. Furthermore, sand especially is continually being replaced by new deposits brought in by streams as the river sand is being used up.

TABLE 31.—*Production of sand in Kansas, 1955 and 1956, by uses*

| Use | | production and value | |
|------------------------|-------------|----------------------|-------------|
| | | 1955 | 1956 |
| Paving | Tons | 2,711,132 | 4,909,428 |
| | Value | \$1,715,333 | \$2,929,790 |
| Structural | Tons | 3,852,773 | 3,640,946 |
| | Value | \$2,701,142 | \$2,651,234 |
| Engine | Tons | 46,306 | 62,308 |
| | Value | \$ 43,051 | \$ 50,914 |
| Railroad ballast | Tons | 56,487 | 51,738 |
| | Value | \$ 20,124 | \$ 30,523 |
| Filter | Tons | 32,948 | 21,771 |
| | Value | \$ 71,504 | \$ 34,061 |
| Molding | Tons | 42,030 | * |
| | Value | \$ 29,030 | * |
| Glass | Tons | * | * |
| | Value | * | * |
| Blast | Tons ..... | ..... | * |
| | Value ..... | ..... | * |
| Other | Tons | 350,806 | 302,743 |
| | Value | \$ 158,403 | \$ 188,325 |

* Undistributed, value included with "Other".

TABLE 32.—*Production of gravel in Kansas, 1955 and 1956, by uses*

| Use | | Production and value | |
|------------------------|-------------|----------------------|-------------|
| | | 1955 | 1956 |
| Paving | Tons | 1,269,706 | 3,255,008 |
| | Value | \$ 988,720 | \$1,850,366 |
| Structural | Tons | 574,285 | 218,922 |
| | Value | \$ 479,748 | \$ 173,302 |
| Railroad ballast | Tons ..... | ..... | 11,181 |
| | Value ..... | ..... | \$ 6,212 |
| Other | Tons | 62,969 | 41,119 |
| | Value | \$ 134,384 | \$ 107,585 |

TABLE 33.—*Directory of sand and gravel producers on record as of December 31, 1956*

| County | Company or operator | Address |
|----------|----------------------------|--------------------------------|
| Anderson | Anderson Co. Highway Dept. | Garnett |
| Barber | Barber Co. Highway Dept. | Medicine Lodge |
| Barton | Barton Co. Highway Dept. | P.O. Box 747, Great Bend |
| do | Arkansas Sand & Gravel Co. | 1423 Second St., Great Bend |
| do | Du Bois Sand Co. | P.O. Box 172, Great Bend |
| do | Gruber Sand Plant | 918 Stone St., Great Bend |
| do | Moos Brothers Sand Co. | Great Bend |
| Brown | Brown Co. Highway Dept. | Hiawatha |
| do | Ralph Mitchell | Hiawatha |

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| County | Company or operator | Address |
|------------|---------------------------------|----------------------------------------|
| Chase | Chase Co. Highway Dept. | Cottonwood Falls |
| Chautauqua | Chautauqua Co. Highway Dept. | Sedan |
| Cheyenne | New Era Sand & Gravel Co. | St. Francis |
| Clark | Clark Co. Highway Dept. | Ashland |
| Clay | Gladys Alsop | Wakefield |
| do | Clay Center Concrete Sand | Clay Center |
| Cloud | Earl Beaver Sand Co. | Glasco |
| do | Ross Sand Co. | P.O. Box 461, Concordia |
| do | Walker Sand Co. | Concordia |
| Coffey | Coffey Co. Highway Dept. | Burlington |
| Comanche | Comanche Co. Highway Dept. | Coldwater |
| Cowley | Cowley Co. Highway Dept. | Winfield |
| do | Arkansas City Sand-Gravel Co. | P.O. Box 116, Arkansas City |
| Coffey | George M. Myers, Inc. | P.O. Box 911, El Dorado |
| Cowley | McFarland Gravel Co. | Arkansas City |
| do | Oxford Sand-Gravel Co. | Oxford |
| do | Phillips & Son Construction | Winfield |
| do | Wilson Bros. | Route 3, P.O. Box 59, Arkansas City |
| do | Winfield Sand & Gravel Co. | Winfield |
| Decatur | Decatur Co. Highway Dept. | Oberlin |
| Dickinson | Shoffner Sand and Gravel Co. | 134 E. Jewell, Salina |
| do | C. Smith Sand & Gravel Co. | 1200 N. Kunev, Abilene |
| Douglas | Bowersock Mills & Power Co. | 546 Massachusetts, Lawrence |
| Edwards | Dave Showalter | Garfield |
| Elk | Elk Co. Highway Dept. | Howard |
| Ellis | Schmidtberger, Lewis C. | Victoria |
| Ellsworth | Ellsworth Co. Highway Dept. | Ellsworth |
| do | Henry Millberger | Wilson |
| Finney | Finney Co. Highway Dept. | Garden City |
| do | Sam Alsop Construction Co. | 1207 Pinecrest, Garden City |
| do | Smith Sand Co. | Burnside Drive, Box 2, Garden City |
| Ford | Davis Sand Co. | Dodge City |
| do | Dodge City Sand Co. | P.O. Box 430, Dodge City |
| do | Miller Sand and Gravel Co. | Dodge City |
| Geary | Junction City Sand & Gravel Co. | Route 3, Junction City |
| do | More Sand Co. | 626 W. 6th St., Junction City |
| Gove | Gove County Highway Dept. | Gove |
| do | Ray Bigslev | Grinnell |
| Grant | Grant Co. Highway Dept. | Ulysses |
| Gray | George M. Myers, Inc. | El Dorado |
| do | Kerr Sand Co. | Cimarron |
| Hamilton | Hamilton Co. Highway Dept. | Syracuse |
| do | Smith Sand Co. | Burnside Drive, Box 2, Garden City |
| do | Syracuse Sand-Gravel Co. | 107 N. Elizabeth St., Syracuse |
| Harper | Harper Co. Highway Dept. | Anthony |
| Harvey | Howard R. Thach | Route 1, Burrton |

| County | Company or operator | Address |
|--------------|-----------------------------------------|------------------------------|
| Haskell | Howard Mitchell | Hugoton |
| Jewell | Jewell Co. Highway Dept. | Mankato |
| Kearny | Kearny Co. Highway Dept. | Lakin |
| do | Glen Popejoy | Ulysses |
| Kingman | Ray Wells | Route 1, Kingman |
| Kiowa | Kiowa Co. Highway Dept. | Greensburg |
| do | Seacat Sand and Excavating | Greensburg |
| Leavenworth | Inland Construction Co. | Box 1993, Wichita |
| do | Missouri Valley Sand, Inc. | P.O. Box 822, Leavenworth |
| Linn | Linn Co. Highway Dept. | Mound City |
| Logan | Logan Co. Highway Dept. | Russell Springs |
| Lyon | Wesley Parks | 648 Oak St., Emporia |
| do | Harry Waterman | 1 Congress St., Emporia |
| McPherson | McPherson Co. Highway Dept. | McPherson |
| Marshall | Marshall Co. Highway Dept. | Marysville |
| do | Blue River Sand-Gravel Co. | Blue Rapids |
| do | C. V. Garrett | Blue Rapids |
| do | Hall Brothers | 204 Calhoun, Marysville |
| do | Heinzelman Construction Co. | Marysville |
| do | Hugo P. Vogler | Waterville |
| Morris | Morris Co. Highway Dept. | Council Grove |
| do | Virgil Metcalf | Route 5, Council Grove |
| Osborne | Osborne Co. Highway Dept. | Osborne |
| Ottawa | Ottawa Co. Highway Dept. | Minneapolis |
| Pawnee | Pawnee Co. Highway Dept. | Larned |
| do | Johnson Sand-Gravel Co. | Larned |
| do | Larned Sand-Gravel Co. | P.O. Box 227, Larned |
| Pottawatomie | Pottawatomie Co. Highway Dept. | Westmoreland |
| do | Anderson-Oxandale | P.O. Box 425, Herington |
| do | Wamego Sand Co. | Wamego |
| Pratt | Pratt Co. Highway Dept. | Pratt |
| do | C. D. Hogard | Pratt |
| do | Miller Sand and Gravel Co. | Route 2, Pratt |
| Reno | Fountain Sand Pit | Arlington |
| do | Haven Sand Co. | Haven |
| do | J. A. Mummy | Nickerson |
| do | J. N. Shears and Sons, Inc. | P.O. Box 227, Hutchinson |
| do | J. E. Steele Sand & Gravel Co. | Route 4, Hutchinson |
| Republic | Republic Co. Highway Dept. | Belleville |
| do | Gladys H. Alsop | Wakefield |
| do | Walker Sand Co. | 1611 Cedar St., Concordia |
| Rice | Arensman Sand-Gravel Co. | Bushton |
| do | Rock Hill Stone & Gravel, Inc. | P.O. Box 412, Sterling |
| do | A. L. Stapleton | 307 S. Garfield, Lyons |
| do | Sterling Sand & Gravel Co., Inc. | P.O. Box 431, Sterling |
| do | A. Tobias W. Wright & D. Birchenough | Lyons |
| Riley | Walters Sand Co., Inc. | P.O. Box 30, Manhattan |
| Russell | Russell Co. Highway Dept. | Russell |
| Saline | Saline Co. Highway Dept. | Salina |

| County | Company or operator | Address |
|------------|------------------------------|---------------------------------------------|
| do | Putnam Sand Building Co. | P.O. Box 26, Salina |
| do | Salina Sand Co., Inc. | 113 W. Minneapolis, Salina |
| Scott | Harry Henery, Inc. | Ottawa |
| Sedgwick | Wichita City Engineer | Wichita 2, Kansas |
| do | John Beagley | Mount Hope |
| do | Bentley Sand Co. | Bentley |
| do | Big Three Sand-Gravel Co. | 2204 N. West, Wichita 15 |
| do | Dolese Brothers Co. | 13 NW 13th St., Oklahoma City, Okla. |
| do | L. C. House | Route 2, Bentley |
| do | Inland Construction Co. | P.O. Box 1993, Wichita |
| do | Walt Keeler Co., Inc. | P.O. Box 1972, Wichita 1 |
| do | McKinster-Gore Sand Co. | Route 6, Box 408, Wichita |
| do | Miles Sand Co. | Valley Center |
| do | Provence Sand Co. | 21st & N. Meridian Wichita |
| do | Southwest Sand and Gravel | Route 8, Wichita 15 |
| do | Superior Sand Co., Inc. | 1800 W. 18th, Wichita 3 |
| do | P. R. York | P.O. Box 61, Sedgwick |
| Shawnee | Shawnee Co. Engineers Office | Topeka |
| do | Inland Construction Co. | P.O. Box 1993, Wichita |
| do | Kansas Sand Co., Inc. | 531 N. Taylor, Topeka |
| do | River Sand Co. | P.O. Box 233, Topeka |
| do | Shoffner Sand, Inc. | Solomon |
| do | Victory Sand and Stone, Inc. | Foot of Waite, Topeka |
| Sheridan | Sheridan Co. Highway Dept. | Hoxie |
| do | Harry Henery, Inc. | Ottawa |
| do | Carl Kaiser | Grainfield |
| Sherman | Sherman Co. Highway Dept. | P.O. Box 22, Goodland |
| do | J. R. Hahn | Goodland |
| do | Tom Ramsey | 802 Center, Goodland |
| do | M. W. Watson | 1004 Nat'l. Bank of Topeka Bldg., Topeka |
| Smith | Smith Co. Highway Dept. | Smith Center |
| Stafford | Stafford Co. Highway Dept. | St. John |
| do | Partin Sand and Gravel Co. | P.O. Box 274, Stafford |
| Stanton | Harry Henery, Inc. | Ottawa |
| Sumner | Sumner Co. Highway Dept. | Wellington |
| do | Mulvane Sand Co., Inc. | Mulvane |
| Thomas | Thomas Co. Highway Dept. | Colby |
| do | Earl Carpenter | Colby |
| do | Hawki-Carpenter | Colby |
| do | Ed Purma | 975 2nd St., Colby |
| do | M. W. Watson | 1004 Nat'l. Bank of Topeka Bldg., Topeka |
| Trego | Trego Co. Highway Dept. | WaKeeney |
| do | Siebert Sand Co. | Trego Center |
| Wabaunsee | Wabaunsee Co. Highway Dept. | Alma |
| Wallace | Wallace Co. Highway Dept. | Sharon Springs |
| Washington | Washington County Engineer | Washington |
| do | Finlayson Gravel Co. | Barnes |
| do | Mueller Sand & Gravel Co. | Hanover |

| County | Company or operator | Address |
|-----------|---------------------------------------|------------------------------------------------------|
| Wichita | M. W. Watson | 1004 Nat'l. Bank of Topeka Bldg., Topeka |
| Wyandotte | American Sand Co. | Turner |
| do | Builders Sand Co. | Morris |
| do | Dreyer Sand Co. | Turner |
| do | Happe Sand Co. | Muncie |
| do | Holliday Sand & Gravel Co. | 728 Railway Exchange Bldg., Kansas City 6, Mo. |
| do | Kaw Valley Sand Co. | 42nd & Speaker Road, Kansas City |
| do | Peck Woolf Sand & Material Co. | 1920 Paseo Blvd., Kansas City 8, Mo. |
| do | Ralph Rees | 1228 Homer St., Kansas City |
| do | Stewart Sand Material Co. | 1805 Grand Ave., Kansas City 8, Mo. |
| Various | State Highway Commission of Kansas | Topeka |
| do | D. G. Hansen | Logan |
| do | San Ore Construction | McPherson |
| do | Sand, Inc. | 1313 West 31, South Wichita 2 |
| do | Railroads | |

STONE

Stone, fourth in importance among the minerals produced in Kansas in 1956, amounted to 13,421,077 tons valued at \$15,644,189, an increase of 7.6 percent in tonnage and a 1.6 percent loss in value when compared to the 1955 production and value (Table 34). Stone produced in Kansas consists of limestone (86.7%), sandstone (2.4%), and chat (10.9%); the last is associated with the metal mining industry of the Tri-State Lead and Zinc District in southern Cherokee County. Chat in the tables is included under "miscellaneous" stone.

Most of the stone produced in Kansas was used for concrete and road metal. In 1956 stone crushed and used for concrete and road metal amounted to 7,598,092 tons valued at \$9,540,862, of which 7,135,772 tons and \$9,284,599 were derived from limestone. Quantitatively, next in importance was stone used for the making of portland and masonry cement, followed by railroad ballast, riprap material, agricultural lime, and dimension stone. On the basis of value, concrete and road metal was first with a value of \$9,540,862, then cement valued at \$2,617,362, followed by riprap stone worth \$987,113, dimension stone valued at \$683,495, railroad ballast valued at \$672,928, and lastly by agricultural limestone with

TABLE 34.—Production and value of stone produced in Kansas, 1955 and 1956, by kinds

| Year | Limestone | | Sandstone | | Miscellaneous | | Total stone | |
|--------------------------------|------------|--------------|-----------|-------------|---------------|-----------|-------------|--------------|
| | Tons | Value | Tons | Value | Tons | Value | Tons | Value |
| 1955 | 10,847,530 | \$14,302,875 | 745,349* | \$1,221,726 | 877,237 | \$362,668 | 12,470,116 | \$15,887,269 |
| 1956 | 11,642,644 | \$14,592,048 | 313,813* | \$ 495,342 | 1,464,620 | \$556,799 | 13,421,077 | \$15,644,189 |
| Percent change from 1955 | +2.4 | -1.7 | -57.9 | -59.5 | +66.9 | +53.5 | +7.6 | -1.6 |

* Excludes dimension sandstone, value for which is included under "Undistributed".

TABLE 35.—Summary of stone production in Kansas, 1955 and 1956, by uses

| Use | 1955 | | 1956 | | Percent change from 1955 |
|----------------------------|------------|--------------|------------|--------------|--------------------------|
| | Tons | Value | Tons | Value | |
| Concrete, road metal | 7,391,915 | 7,589,092 | 7,391,915 | 7,589,092 | +2.7 |
| Cement | 9,851,626 | \$ 9,540,862 | 9,851,626 | \$ 9,540,862 | -3.2 |
| Riprap | 2,955,050 | 2,897,487 | 2,955,050 | 2,897,487 | -2.0 |
| Dimension stone* | 2,955,050 | \$ 2,617,362 | 2,955,050 | \$ 2,617,362 | -11.5 |
| Railroad ballast | 703,567 | 977,878 | 703,567 | 977,878 | +38.9 |
| Agricultural | 969,192 | \$ 987,113 | 969,192 | \$ 987,113 | +1.8 |
| Other | 40,875 | 28,375 | 40,875 | 28,375 | -30.6 |
| Total | 731,665 | \$ 683,495 | 731,665 | \$ 683,495 | -6.6 |
| Concrete, road metal | 797,944 | 1,249,983 | 797,944 | 1,249,983 | +56.6 |
| Cement | 439,333 | \$ 672,928 | 439,333 | \$ 672,928 | +53.1 |
| Riprap | 426,090 | 261,368 | 426,090 | 261,368 | -38.6 |
| Dimension stone* | 611,407 | \$ 378,191 | 611,407 | \$ 378,191 | -38.2 |
| Railroad ballast | 155,175 | 407,894 | 155,175 | 407,894 | +162.8 |
| Agricultural | 328,996 | \$ 764,238 | 328,996 | \$ 764,238 | +132.2 |
| Other | 12,470,116 | 12,893,231 | 12,470,116 | 12,893,231 | +7.6 |
| Total | 15,887,269 | \$15,116,343 | 15,887,269 | \$15,116,343 | -1.6 |

* Excludes dimension sandstone, value for which is included under "Undistributed".

a value of \$378,191. With the exception of riprap and railroad ballast production, all other stone production declined during 1956. A summary of Kansas stone production and values by kinds for 1955 and 1956 is presented in Table 35. Table 36 shows Kansas stone production and values by kinds of rock and uses for 1955 and 1956.

TABLE 36.— *Kansas stone production and values by kinds of rock and uses, 1955 and 1956*

| | 1955 | | 1956 | |
|-------------------------------|-----------|-------------|-----------|-------------|
| | Tons | Value | Tons | Value |
| Limestone | | | | |
| Concrete and road metal | 6,907,857 | \$9,285,330 | 7,135,772 | \$9,285,599 |
| Cement | 2,955,050 | 2,955,050 | 2,897,487 | 617,362 |
| Riprap | 289,660 | 293,898 | 882,774 | 853,134 |
| Dimension stone | 40,375 | 731,665 | 28,375 | 683,495 |
| Agricultural | 426,090 | 611,407 | 261,368 | 378,191 |
| Railroad ballast | 73,323 | 96,529 | 47,861 | 62,880 |
| Other or miscellaneous | 3,110,225 | 3,284,046 | 389,007 | 712,287 |
| Sanstone | | | | |
| Railroad ballast | 68,309 | 93,280 | 165,253 | 231,025 |
| Riprap | 407,907 | 670,194 | 95,104 | 133,979 |
| Concrete and road metal | 269,133 | 485,252 | 34,569 | 78,487 |
| Other | | | 18,887 | 51,851 |
| Dimension stone | * | * | * | * |
| Miscellaneous stone | | | | |
| Railroad ballast | 656,312 | 249,524 | 1,036,869 | 379,023 |
| Concrete and road metal | 214,925 | 108,524 | 427,751 | 177,776 |
| Riprap | 6,000 | 5,100 | ..... | ..... |

* Value included under "Undistributed", Table 1.

The stone reserves of Kansas are extremely large and for practical purposes may be considered inexhaustible.

In 1956 stone in Kansas was produced by 70 commercial companies operating in 41 counties and by 35 noncommercial operators, principally county highway departments. A new stone quarry and plant capable of producing stone at the rate of 300 tons per hour was opened by Walt Keeler near Florence in Marion County during the year. In addition 2 new companies, the Southwest Chat Co. and the Southwest Rock and Chat Co., both of Baxter Springs, were added to the chat utilization companies operating in Cherokee County. Greatest activity in the stone industry centered in Wyandotte and Elk Counties, which quantitatively accounted for 24.7 percent of the state's limestone and 21.4 percent of all stone produced, or in terms of dollar value, 19.7 and 18.4 percent respectively.

A directory of stone producers in Kansas operating in 1956 is given in Table 37.

TABLE 37.—*Directory of stone producers on record as of December 31, 1956*

| County | Company or operator | Address |
|------------|------------------------------------------|--------------------------------------------------------------------------|
| Allen | Allen Co. Highway Dept. | Iola |
| do | Lehigh Portland Cement Co. | Iola |
| do | Monarch Cement Co. | Humboldt |
| do | Nelson Bros. Quarries | La Harpe |
| Anderson | Garnett Rock Co. | Garnett |
| do | Nelson Bros. Quarries | La Harpe |
| Atchison | Jefferson Co. Engineer | Oskaloosa |
| do | District Engineer, Corps of Engineers | 1800 Fed. Office Bldg., 911 Walnut St., Kansas City 6, Missouri |
| do | Geo. W. Kerford Quarry Co. | Atchison |
| Bourbon | Bourbon Co. Highway Dept. | Fort Scott |
| do | Bandera Stone Quarry | 222 W. 72nd St., Kansas City, Mo. |
| do | Cullor Limestone Co., Inc. | Route 1, Fort Scott |
| do | Fort Scott Hydraulic Cement Co. | P.O. Box 267, Fort Scott |
| Butler | Amis Construction Co. | P.O. Box 1871, Oklahoma City, Okla. |
| do | George M. Myers | P.O. Box 911, El Dorado |
| Chase | Everett Quarries, Inc. | Plattsburg, Mo. |
| do | Riddle Quarries, Inc. | National Bank of America Bldg., Salina |
| do | Frank Trager | Sedan |
| Chautauqua | Sedan Limestone Co. | Baxter Springs |
| Cherokee | Baxter Chat | Baxter Springs |
| do | Eagle-Picher Mining and Smelting Co. | Miami, Oklahoma |
| do | C. Y. Semple | P.O. Box 390, Baxter Springs |
| do | Southwest Chat Co. | Baxter Springs |
| do | Southwest Rock and Chat Co. | Baxter Springs |
| Clay | Riddle Quarries, Inc. | National Bank of America Bldg., Salina |
| Coffey | Neosho Valley Rock Co. | Burlington 2, Kansas |
| do | Jones Rock Co. | Emporia |
| Cowley | Anderson-Oxandale | P.O. Box 425, Herington |
| do | John V. Elam | Winfield |
| do | Silverdale Limestone | Route 3, Box 180, Arkansas City |
| do | Silverdale Cut Stone | Silverdale |
| Dickinson | Anderson-Oxandale | P.O. Box 425, Herington |
| do | Riddle Quarries, Inc. | National Bank of America Bldg., Salina |
| Doniphan | District Engineer, Corps of Engineers | 1800 Fed. Office Bldg., 911 Walnut St., Kansas City 6, Missouri |
| do | Everett Quarries, Inc. | Plattsburg, Mo. |
| do | George W. Kerford Co., Inc. | Atchison |
| do | Wolf River Limestone, Inc. | Troy |
| Douglas | Clark Rock Quarry | Overbrook |
| Elk | Elk Co. Highway Dept. | Howard |
| do | Concrete Materials Const. Co. | Moline |

| County | Company or operator | Address |
|--------------|--------------------------------------|----------------------------------------|
| Franklin | Franklin Co. Highway Dept. | Ottawa |
| do | Anderson-Oxandale | P.O. Box 425, Herington |
| Geary | Grosshans and Petersen | Wathena |
| do | Walker Cut Stone Co. | P.O. Box 269 |
| | | Junction City |
| Graham | E. C. Schroeder Co. | McGregor, Iowa |
| do | Solomon Construction, Field Division | |
| Greenwood | Greenwood Co. Highway Dept. | Eureka |
| Jackson | Reno Construction Co. | Overland Park |
| Jefferson | Roy Baker | Valley Falls |
| do | N. R. Hamm Quarry, Inc. | Perry |
| Jewell | Ideal Cement Co. | Superior, Nebraska |
| Johnson | Johnson Co. Highway Dept. | Olathe |
| do | Deitz-Hill Development Co. | 28 SW Blvd., Kansas City 10, Mo. |
| do | Reno Construction Co. | Overland Park |
| Labette | Labette Co. Highway Dept. | Oswego |
| Leavenworth | City of Leavenworth Street Dept. | Leavenworth |
| do | Kansas State Penitentiary | Lansing |
| do | Wyandotte Co. Engineer | Kansas City |
| Lincoln | Quartzite Stone Co. | Lincoln |
| Linn | Lee Giles | Greeley |
| do | Murray Limestone Products Co. | Centerville |
| do | E. C. Schroeder Co. | |
| do | Texas Construction Co. | Stockton |
| Lyon | Anderson-Oxandale Co. | P.O. Box 425, Herington |
| Marion | Riddle Quarries, Inc. | National Bank of America Bldg., Salina |
| Miami | Miami Co. Highway Dept. | Paola |
| do | L. W. Hayes, Inc. | 4550 Main St., Kansas City 2, Mo. |
| Montgomery | Anderson-Oxandale Co. | P.O. Box 425, Herington |
| Morris | Anderson-Oxandale Co. | P.O. Box 425, Herington |
| Nemaha | Anderson-Oxandale Co. | P.O. Box 425, Herington |
| Neosho | Neosho Co. Engineer | Erie |
| do | Ash Grove Lime-Portland Cement Co. | 101 W. 11th St., Kansas City, Mo. |
| do | Harry Byers | 500 N. Plummer, Chanute |
| do | Joe O'Brien | St. Paul |
| Osage | Osage County Engineer | Lyndon |
| do | Shawnee Co. Highway Dept. | Topeka |
| do | Dusenbury, Inc. | P.O. Box 224, Melvern |
| Pottawatomie | Pottawatomie Co. Highway Dept. | Westmoreland |
| do | Manhattan Cut Stone Co., Inc. | P.O. Box 855, Manhattan |
| Rice | Riddle Quarries | National Bank of America Bldg., Salina |
| Riley | H. Riley Reservation | |
| do | Bayer Construction Co. | Manhattan |
| do | W. O. Homer | Grand Ave., Junction City |
| do | Manhattan Stone Co. | Route 1, Manhattan |
| Shawnee | Shawnee County Engineer | Topeka |
| do | Henry C. Luttjohann | 2001 James St., Topeka |
| do | Netherland Stone Co. | Route 2, Topeka |
| do | Pattons Crushed Stone Co. | Pauline |

| County | Company or operator | Address |
|-----------|---------------------------------|----------------------------------------------|
| Wilson | Anderson-Oxandale Co. | P.O. Box 425, Herington |
| do | Benedict Rock and Lime Co. | Benedict |
| do | Carr Rock Products | 315 N. 8th St., Neodesha |
| do | Consolidated Cement Corp. | Fredonia |
| Wyandotte | American Rock Crusher Co. | 3700 Rainbow Blvd., Rosedale, Kansas City |
| do | Joe Gregor | 836 Bunker St., Kansas City |
| do | Lone Star Cement Corp. | 1650 Dierks Bldg., Kansas City 6, Mo. |
| do | Peerless Stone Products, Inc. | Turner |
| do | Thompson-Strauss Quarries, Inc. | 7000 Holliday Drive, Kansas City |

METALS

Lead and zinc are the only metals mined in Kansas. All of the mines are in the southeast corner of Cherokee County in the extreme southeast part of the state. In 1956 Kansas produced lead and zinc worth \$10,251,600, or \$1,818,691 more than in 1955. The metals contributed 2 percent of the value of all minerals produced in the state (Table 4, Fig. 3). In 1956 Kansas produced 7,635 tons of recoverable lead and 28,665 tons of recoverable zinc. Forty-five zinc mines operated by 28 producers were active in the Kansas lead and zinc area. Of the 45 mines, all produced zinc and all but 7 produced lead. Of the 28 producers, 5 companies produced no lead in 1956.

LEAD

Increase in lead production started in 1955 and continued in 1956. In 1956 Kansas produced 7,635 tons of recoverable lead compared to 5,498 tons in 1955, an increase of 38.9 percent. The Kansas lead in 1956 was worth \$2,397,390, or \$756,787 more than in the preceding year, a gain of 46.1 percent in value. On record as having produced lead in 1956 are 38 mines operated by 19 companies and 4 gougers.

The National Lead Company of St. Louis was the principal lead producer in 1956 followed by the Eagle-Picher Mining and Smelting Company of Miami, Oklahoma. The only lead smelter operated in Kansas was that of the Eagle-Picher Mining and Smelting Company smelter at Galena, Cherokee County. This smelter treated ores not only from Kansas but also from the en-

tire Tri-State District, and some from Illinois. A lead pigment plant operated by the Ozark Smelting and Mining Company of Coffeyville, Montgomery County, was active during 1956.

Data on lead production in Kansas in 1955 and 1956 and directory of lead producers on record as of December 31, 1956, are presented in Tables 38 and 39 respectively.

TABLE 38.—Quantity and value of lead produced in Kansas, 1955 and 1956

| Year | Concentrates (galena) | | Recoverable metal (lead) | | Percent change from previous year | |
|------------|--------------------------|-------------|-----------------------------|-------------|--------------------------------------|-------|
| | Tons | Value | Tons | Value | Amount | Value |
| 1955 | 7,362 | \$1,352,876 | 5,498 | \$1,640,603 | | |
| 1956 | 10,130 | \$1,955,278 | 7,635 | \$2,397,390 | +38.9 | +46.1 |

TABLE 39.—Directory of lead and zinc producers in Kansas on record as of December 31, 1956

| Company or Operator | Address | Mine* |
|-----------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| J. W. Atherton | Joplin, Missouri | Hunter |
| B & I Mining Co. | Picher, Okla. | Hartley |
| Kenneth Bagin | Baxter Springs | Thomas |
| Bonanza Mining Co. | Picher, Okla. | Semple |
| Carey-McCoy Mining Co. | Treece | Sonny Boy |
| John Carmack | Picher, Okla. | Homestake |
| Robert Cole | | Thomas |
| G. W. Duncan | c/o C. G. Marquiss, 5th & Military, Baxter Springs | Race Track |
| Eagle-Picher Mining and Smelting Co. | Miami, Okla. | Big John, Bilharz, Fox, Grace "B", K. E. Unit Smelter, Lucky Jew, Middlings, Weber, Westside, Wright Lease |
| Wesley Forgey | | MacArthur |
| W. T. Grantham | Baxter Springs | Grantham |
| Helen H. Mining Co. | St. Louis 1, Missouri | Karcher-Stebbins |
| John Henderson | Picher, Okla. | Wilbur |
| Searcy Henderson | Picher, Okla. | Stoskopf |
| Little Ben Mining Co. | Baxter Springs | Clark, Keith |
| J. Robert Mason | Baxter Springs | Brewster |
| National Lead Co., St. Louis Smelting & Refining Division | Fredericktown, Missouri | Ballard, Hartley, Moore, Shanks, Slaughter, Smith, Swalley |
| Mid-Century Mining Co. | Cardin, Okla. | Bendelari |
| C. H. Rea | Baxter Springs | Robinson |
| S. S. & R. Mining Co. | Joplin, Missouri | Hunter |
| Harold Sheeran | Miami, Okla. | Kansouri |
| Mark Twain Mining Co. | Picher, Okla. | Jarrett |
| Woods & Shira | Picher, Okla. | Thomas |
| 4 Miscellaneous Gougers | | Various |

* All lead and zinc mines are in Cherokee County.

ZINC

Zinc, eighth in rank among Kansas minerals produced, increased from 27,611 tons valued at \$6,792,306 in 1955 to 28,665 tons worth \$7,854,210 in 1956, an increase of 3.8 and 15.6 percent respectively. During 1956, 24 companies and 4 gougers produced zinc from 45 mines.

As with lead, the National Lead Company of St. Louis, Missouri, was the largest zinc producer in the state, followed by the Eagle-Picher Mining and Smelting Company of Miami, Oklahoma. A zinc pigment plant was active in Cherryvale, Montgomery County, in 1956. This plant was operated by the National Zinc Company. The Cherryvale Zinc Company, a subsidiary of International Minerals and Metals Company of New York City, built a pilot plant at Cherryvale, Montgomery County, for the purpose of reclaiming tin from waste by-products of the copper industry. This company reclaims zinc from waste by-products of the copper industry.

Data on zinc production in Kansas in 1955 and 1956 and directory of zinc producers on record as of December 31, 1956, are presented in Tables 40 and 39 respectively.

TABLE 40.—*Quantity and value of zinc produced in Kansas, 1955 and 1956*

| Year | Concentrates (sphalerite) | | Recoverable metal (zinc) | | Percent change from previous year | |
|------------|------------------------------|-------------|-----------------------------|-------------|--------------------------------------|-------|
| | Tons | Value | Tons | Value | Amount | Value |
| 1955 | 51,252 | \$3,980,849 | 27,611 | \$6,792,306 | | |
| 1956 | 53,142 | \$4,688,130 | 28,665 | \$7,854,210 | +3.8 | +15.6 |

UNDISTRIBUTED MINERALS

Kansas produced several minerals that are classified as "undistributed". Undistributed mineral commodities are those whose total quantity and value cannot be revealed, because they are produced by fewer than 3 companies or because they are produced almost exclusively by 1 company. Such minerals in 1956 include diatomaceous marl, gypsum, natural cement, salt brine, volcanic ash or pumicite, and dimension sandstone. In addition, perlite and expanded vermiculite were processed within recent years from material shipped into Kansas from outside sources. The total value of undistributed minerals in Kansas in 1956 amounted to \$2,083,811.

CEMENT (NATURAL)

Natural cement has been produced in Kansas since 1869. The only producer in the state is the Fort Scott Hydraulic Cement Co. of Fort Scott in Bourbon County. As in 1955, production and shipments of natural cement continued to show increases. Shipments in 1956 exceeded shipments in 1955 by more than 21 percent, whereas at the same time values increased to slightly less than 30 percent. The value of the 1956 natural cement shipments is included in the value listed under "Undistributed" in Table 1. Reserves of natural cement rock are unlimited.

DIATOMACEOUS MARL

Diatomaceous marl is produced in Wallace County by the De Lore Division of the National Lead Company of St. Louis, Missouri. Production and value in 1956 remained essentially the same as in 1955. Value of the diatomaceous marl is included in the total listed under "Undistributed" in Table 1.

The known deposits are estimated to exceed 1 million tons.

GYPSUM

Gypsum in Kansas is produced in Barber County near Medicine Lodge by the National Gypsum Co. of Buffalo, New York, and in Marshall County at Blue Rapids by the Bestwall Gypsum Co., a newly organized gypsum company with general offices at Ardmore, Pennsylvania, and successor to Certain-teed Products Co. also of Ardmore, Pennsylvania. Production of crude gypsum was essentially the same in 1956 as in 1955. The value of crude gypsum produced in 1956, however, was almost 13 percent less than it was in the preceding year. Calcined gypsum declined in production by 2.6 percent with a corresponding loss of 19.5 percent in value. The Certain-teed Products Co. was taken over by the Bestwall Gypsum Co. of Ardmore, Pennsylvania. The value of the crude gypsum produced is included under the value assigned to the "Undistributed" minerals (Table 1).

The reserves of gypsum are known to be extensive, and at the present rate of production and use they are sufficient for production to be maintained for many years to come.

PERLITE AND VERMICULITE

Expanded perlite and expanded vermiculite were processed in Kansas from raw materials imported from other states. Owing to a slight increase in price, expanded perlite showed a gain of 5 percent in 1956 when compared to the value of 1955, whereas expanded vermiculite dropped 22 percent in value during the same time. Expanded perlite was processed by the Panacalite Perlite, Inc., of Kansas City, Wyandotte County, and expanded vermiculite by the Dodson Manufacturing Company of Wichita, Sedgwick County. Values of perlite and vermiculite are included in the total listed under "Undistributed" in Table 1.

PUMICITE, OR VOLCANIC ASH

Only 2 companies reported production of pumicite, or volcanic ash, in Kansas in 1956 as compared to 4 companies in 1955. In May 1955 the Cudahy Packing Company's mine in Meade County was sold to the Purex Corporation, Ltd., of Meade, Kansas, who subsequently reported their acquired mine as permanently shut-down. Pumicite, or volcanic ash, was produced in Lincoln and Norton Counties in 1956 with greatest production in Norton County. Value is included in the total listed under "Undistributed" in Table 1.

Estimated reserves of pumicite, or volcanic ash, in Kansas approximate 9.7 million tons.

Producers on record for 1956 are listed in Table 41.

TABLE 41.—*Directory of Kansas producers of pumicite, or volcanic ash, in 1956*

| County | Company | Office Address | Pit location nearest town |
|---------|--------------------------|---------------------|------------------------------|
| Lincoln | Ernest Hanzlicek | Wilson | Wilson |
| Norton | Wyandotte Chemical Corp. | Wyandotte, Michigan | Calvert |

SALT BRINE

The Frontier Chemical Company of Kansas, Inc., at 321 W. Douglas Street, Wichita, produces salt from salt brine pumped from its salt brine wells near Wichita in Sedgwick County for use in the manufacture of industrial inorganic chemicals. Production of salt and its value in 1956 by this company more than doubled when compared to that of the preceding year. Value of the salt

produced is included in the total listed under "Undistributed" in Table 1.

SANDSTONE (DIMENSION)

Dimension sandstone was produced by the Bandera Stone Quarry Company of 222 W. 72nd. Street, Kansas City, Missouri. The quarry is located near Redfield in Bourbon County, Kansas. Production in 1956 is estimated to have been essentially the same as in 1955. The Bandera sandstone is used for building stone, including rough construction stone, sawed stone, and flagging stone. Value of dimension sandstone is included in the total listed under "Undistributed" in Table 1.

UNEVALUATED MINERAL RESOURCES

WATER AND SOIL

Two of the most important mineral resources of Kansas are water, both surface and underground, and soil. Water and soil are truly mineral commodities, but because of their nature and universal usage are difficult to evaluate as to quantity and value. Water, to a considerable extent, is a replenishable resource in that water supplies may be completely replenished in some geologic situations and only partly replenished in others. Soil lost by erosion is replaced only by slow soil-building processes. No data are at hand at present in regard to the actual quantity of soil that exists in Kansas. Without the soil that covers the 82,113 square miles of land surface (total area including water surface is 82,276 square miles), Kansas could not have produced \$1 billion to \$1.5 billion dollars worth of agricultural products including livestock each year since 1950. The amount of available water and the quantity used or consumed in the state in 1953 were estimated by the Kansas Water Resources Fact-Finding and Research Committee in 1954. According to the survey, a total of 1,898 mdg (million gallons a day) was withdrawn from the available water resources, but the amount consumed and removed from the supply for all purposes amounted to 652 mgd, or 237,980 million gallons per year. The actual value of the 237,980 million gallons consumed per year is not known. It is estimated (Foley, Smrha, and Metzler, 1955, p. 1) that city dwellers pay an average of only about \$5 a year each for water, and rural residents somewhat less. On the assumption that 51 percent of the population is urban and

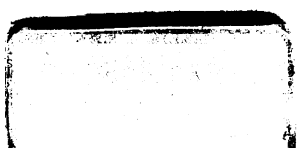
49 percent rural, the minimum value of water consumed is computed to be about \$9,000,000 a year. This sum, however, does not include the value of water consumed by industry, which is estimated to pay an additional \$27,000,000 a year, or about three-fourths of the state's water bill. The figures cited are not intended to be exact, but they do suggest the magnitude of the value of water consumed in Kansas each year.

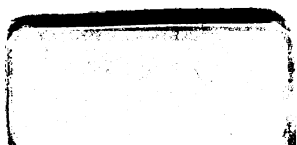
UNEXPLOITED MINERALS

In addition to the minerals produced, there are other mineral commodities in Kansas that either have never been exploited or are not at present being produced on a commercial scale. Such minerals include aluminum from clays (Kinney, 1943, 1952), bentonite (Kinney, 1942), chalk (Runnels and Dubins, 1949), of which the state has virtually unlimited supplies, iron (Jewett and Schoewe, 1942, p. 103), magnesium (Schoewe, 1943; Jeffords, 1948), mineral water (Schoewe, 1953, p. 133), oil shale (Runnels and others, 1952), phosphatic nodules (Runnels, 1949; Runnels and others, 1953), pyrite (Jewett and Schoewe, 1942, p. 168), rock asphalt (Jewett, 1940), and tripoli (Jewett and Schoewe, 1942, p. 168). Still other minerals are known to occur in Kansas, such as germanium (Schleicher and Hambleton, 1954) and uranium (Runnels, Schleicher, and Van Nortwick, 1953), but these have not been investigated sufficiently to show whether they exist in commercial quantities. Further study of these unexploited minerals in Kansas coupled with favorable economic conditions may eventually result in the production of some, if not all, of these mineral commodities.

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- PART 2. SIMPSON FILLED SINKHOLES IN EASTERN KANSAS, by Daniel F. Merriam and William R. Atkinson, p. 61-80, fig. 1-6, pl. 1, April 15, 1956.
- PART 3. CHEMICAL COMPOSITION OF EASTERN KANSAS LIMESTONES, by Russell T. Runnels and John A. Schleicher, p. 81-103, fig. 1, June 1, 1956.
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- PART 6. PETROLOGY OF THE NODAWAY UNDERCLAY (PENNSYLVANIAN), Kansas, by N. J. McMillan, p. 187-249, fig. 1-10, pl. 1-4, November 15, 1956.
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- PART 4. RELATIONSHIP OF THE LANSING GROUP AND THE TONGANOXIE ("STALNAKER") SANDSTONE IN SOUTH-CENTRAL KANSAS, by Richard L. Winchell, p. 123-152, fig. 1-4, pl. 1-3, December 15, 1957.
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