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STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION

MINERAL RESOURCES
AND MINERAL INDUSTRIES
OF THE SPRINGFIELD
REGION, ILLINOIS

Robert L. Major



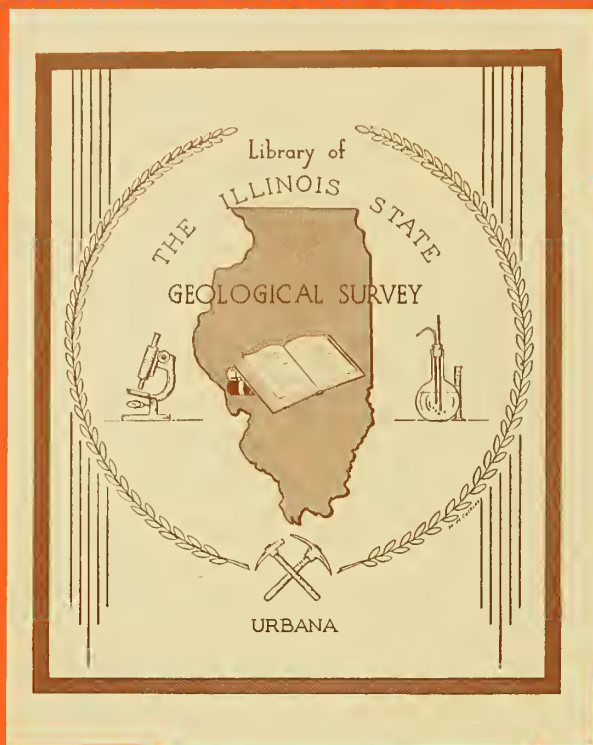
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OF THE SPRINGFIELD REGION, ILLINOIS

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ABSTRACT

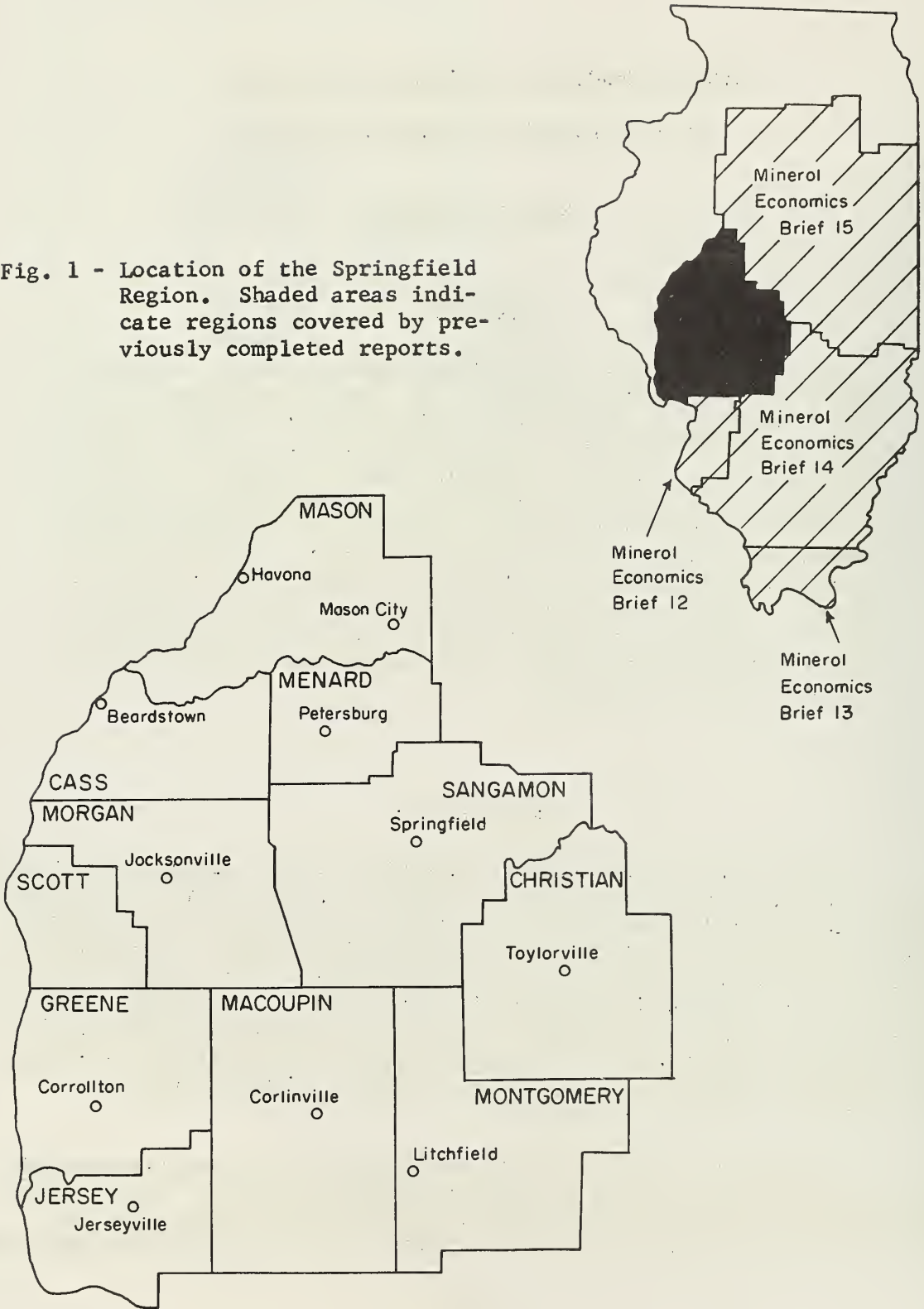
The mineral resources, primary mineral producing operations, and mineral processing facilities in the Springfield Region are located and described in this report. The region, located in the west-central part of the state, includes Cass, Christian, Greene, Jersey, Macoupin, Mason, Menard, Montgomery, Morgan, Sangamon, and Scott Counties and the city of Springfield, the capital of Illinois. Value of mineral production in the region in 1965 was \$40.1 million, and the minerals and mineral products produced, in order of their value, were coal, crude oil, crushed and broken stone, clay products, sand, and gravel. In addition to the primary mineral operations, the region possesses a vermiculite processing plant, an iron ore pigment grinding plant, a secondary zinc smelter, and a small crude oil refinery, plus numerous oil and gas pipelines.

INTRODUCTION

This report is the fifth in a series of eight concerning Illinois mineral resources and related mineral industries. The series is being prepared by the Mineral Economics Group, with the assistance of staff members in other sections of the Illinois State Geological Survey. All production statistics used, unless otherwise noted, are based on the annual reports on Illinois mineral production published by the Survey. Each report considers one particular region of the state. This report covers the Springfield Region, which comprises the following 11 counties in west-central Illinois: Cass, Christian, Greene, Jersey, Macoupin, Mason, Menard, Montgomery, Morgan, Sangamon, and Scott (fig. 1).

The relative importance of this region as a producer of various mineral commodities from 1955 to 1965 is shown in figure 2. Stone production has shown a rather steady growth, coal a decline, while crude oil, clay products, and sand and gravel production have fluctuated but essentially

Fig. 1 - Location of the Springfield Region. Shaded areas indicate regions covered by previously completed reports.



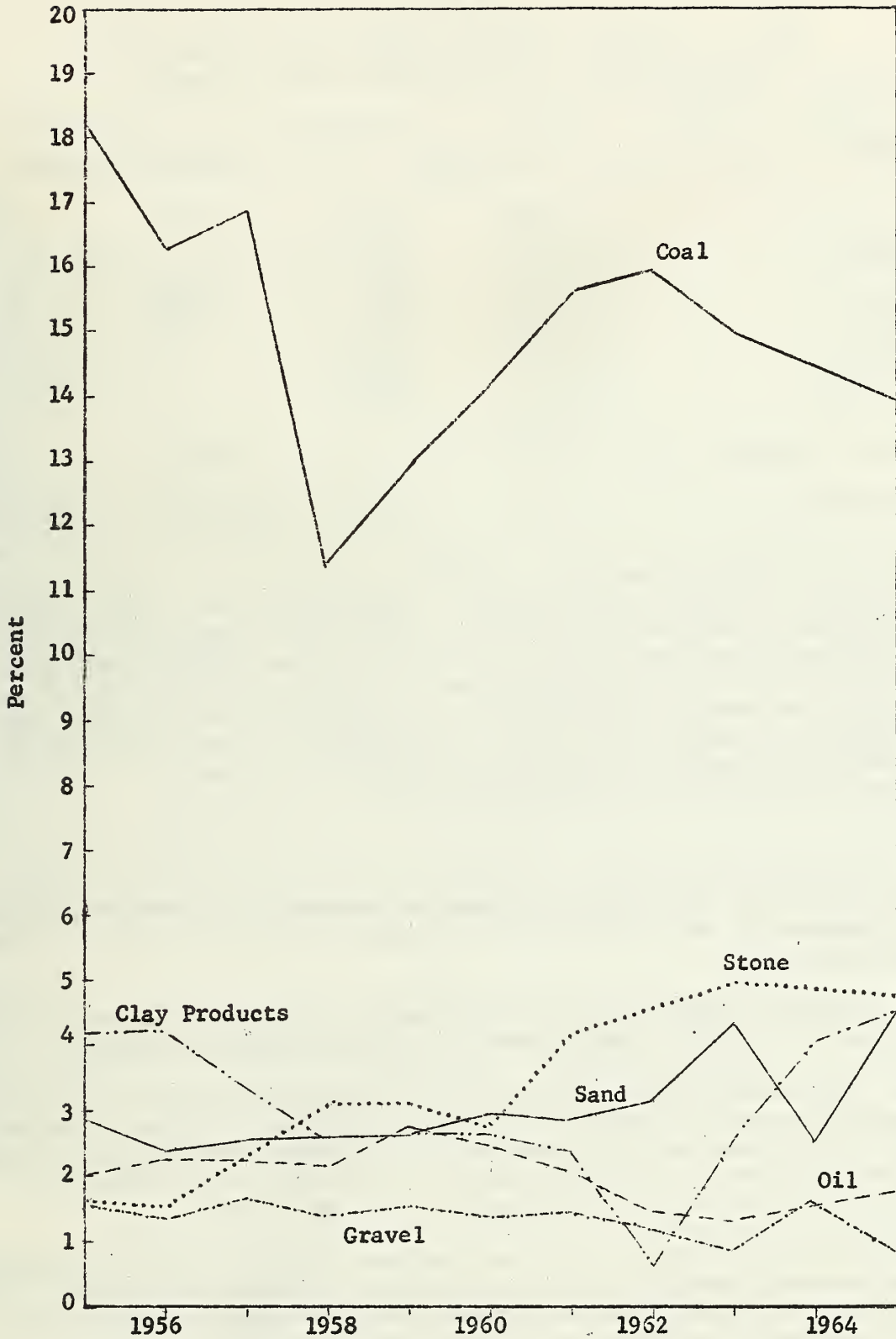


Fig. 2 - Springfield Region mineral production (1955-1965) as a percentage of the total Illinois production of each commodity.

TABLE 1 - EMPLOYMENT AND PAYROLL OF THE MINERAL INDUSTRIES IN
SELECTED COUNTIES IN THE SPRINGFIELD REGION, ILLINOIS*†

County	Employees		Payroll (in \$1000)	
	1958	1963	1958	1963
Christian	839	NA ^o	4,166	NA
Greene	32	NA	109	NA
Menard	32	NA	90	NA
Sangamon	138	151	610	706
Scott	17	NA	80	NA
Regional (partial) total	1,058	151	\$5,055	\$706
State total	27,482	22,675	\$144,359	\$138,394

*Source: U. S. Bureau of the Census, 1961, 1966

†Data are not available for Jersey, Macoupin, Mason, and Montgomery Counties. Cass and Morgan Counties have no mineral operations. In 1965 Jersey County had three stone quarries; Macoupin County had one coal mine and produced some crude oil; Mason County had one sand pit and one gravel pit; Montgomery County had two coal mines, three stone quarries, and produced some crude oil. Therefore, the total employment and payroll of the mineral industries in the Springfield Region are probably considerably larger than the partial totals shown above.

^oData not available in Census of Mineral Industries.

remained the same. The region has been an important coal producer, accounting for between 11 and 19 percent of the state production during the above-mentioned period.

Table 1 shows the payroll and number of persons employed in the mineral industries for selected counties in the Springfield Region.

The mineral production value for the region (table 2) was \$39.0 million in 1964 and \$40.1 million in 1965, or 6.3 and 6.5 percent, respectively, of the state total for each of the two years. The six main commodities produced, in order of their value in 1965, were coal, crude oil, crushed and broken stone, clay products, sand, and gravel.

Each of the commodities is considered here in terms of resources, past and present production, and the extent of producing facilities. Underdeveloped minerals of potential importance also are discussed, as are the mineral processing facilities of the Springfield Region.

COAL

Illinois is abundantly endowed with coal resources. The results of a detailed study of coal reserves in the state, begun in 1950 under the

TABLE 2 - MINERAL PRODUCTION IN THE SPRINGFIELD REGION, ILLINOIS,
1964 and 1965*

Commodity	Quantity	Value	Operations	Average value
<u>1964</u>				
Coal (tons)	7,976,388	\$30,230,511	7	\$3.79/ton
Stone (tons) (crushed & broken)	1,874,845	2,627,796	15	1.40/ton
Crude oil (barrels)	1,102,000	3,228,860	---	2.93/bbl
Clay products	---	2,097,870	4	---
Sand (tons)	360,000	376,000	3	1.04/ton
Gravel (tons)	278,000	441,000	4	1.59/ton
Total value		\$39,002,031		

<u>1965</u>				
Coal (tons)	8,148,548	\$30,475,570	6	\$3.74/ton
Stone (tons) (crushed & broken)	2,063,999	3,021,266	14	1.46/ton
Crude oil (barrels)	1,115,000	3,266,950	---	2.93/bbl
Clay products	---	2,399,431	3	---
Sand (tons)	598,000	622,000	4	1.04/ton
Gravel (tons)	168,000	266,000	4	1.58/ton
Total value		\$40,051,217		

*Small quantities of natural gas were produced in the Springfield Region in 1964 and 1965, but data are confidential.

direction of Gilbert H. Cady, were published by the Geological Survey in 1952 as Bulletin 78 (Cady, 1952). Estimates for 20 coals were made and grouped into four categories of reserves — proved, probable, strongly indicated, and weakly indicated — based on reliability of data. All coals less than 28 inches thick were excluded. The total estimated reserves of all classes amounted to more than 137 billion tons in the ground, of which 61 billion tons are included in the two most reliable classes.

No attempt was made in Bulletin 78 to differentiate strippable reserves from underground reserves. Therefore, in 1957, a new study was begun to evaluate strippable coal reserves in the state. The state was divided into nine resource regions, and by the end of 1965, studies of five of these areas had been completed. The results have been published as Illinois State Geological Survey Circulars 228, 260, 311, 348, and 374 (Smith, 1957, 1958, 1961; Smith and Berggren, 1963; Reinertsen, 1964). The coals were classed on the basis of depths of overburden (0 to 50 feet, 50 to 100 feet, and 100 to 150 feet) and according to reliability of data (Class I - Primary Reserves; Class II - Secondary Reserves). Coals less than 18 inches thick were excluded.

Total coal reserves for some of the counties in the Springfield Region reported in Bulletin 78 were modified by Smith (1961) by adding the new reserves that had been calculated in the strippable coal reserves studies. Several counties had downward revisions because the subsequent work by Smith showed that certain of the estimates in Bulletin 78 were too high. The revised figure for the total minable coal reserves in the Springfield Region now stands at 27.4 billion tons, or about 20 percent of the state's reserves. On the other hand, work by Clegg (1961) indicated that the 1952 estimates of reserves for certain of the deep coals found in Macon, Christian, and Sangamon Counties were conservative. He suggested an upward revision of more than 2 billion tons. Strippable coal reserves for the part of the region that has been evaluated amount to 2.4 billion tons in the ground. This means that only about 10 percent of the region's known reserves are of the strippable type. Figures 3 and 4 show the county-by-county breakdown on strippable and total minable coal reserves.

Locations of operating coal mines and coal production in the Springfield Region in 1965 are shown in figure 5. Coal has been mined in all of the counties in the region except Mason. However, at present only five are active producers. In 1965 Christian County was the leading producer by a wide margin, and it leads in cumulative production (1882-1965) by a slight margin over Macoupin County. For each county, the cumulative production (1882-1965) of coal, the total number of years of active mining, and the last year of reported production appear in figure 6.

Figures 7 and 8 indicate some general trends in the coal industry of the Springfield Region during the past 17 years. From 1948 to 1965, the number of operating coal mines declined sharply, paralleling the industry-wide trend. However, in contrast to the record elsewhere in Illinois, the regional production in the Springfield area also sharply declined, reaching its lowest point in 1958. The trend since has been upwards. There is practically no strip mining in the region.

Table 3 gives the average reported value per ton of coal produced by each county annually from 1955 to 1965.

STONE

Crushed and Broken Limestone

In Illinois the principal products of the stone industry are crushed and broken stone for road surfacing, for agricultural limestone, and for aggregate used in concrete and bituminous roads and in concrete structures. The Springfield Region contains substantial carbonate rock resources. Rocks of Pennsylvanian age, containing thin limestones, are the most extensive areally. In the western part of the region, along the Illinois River, thicker limestones of Mississippian age crop out, as do less extensive exposures of Silurian and Devonian rocks. Near Grafton, in southern Jersey County, a deposit of high-purity dolomite crops out. Willman (1943) discussed this dolomite occurrence in some detail (p. 85-87).

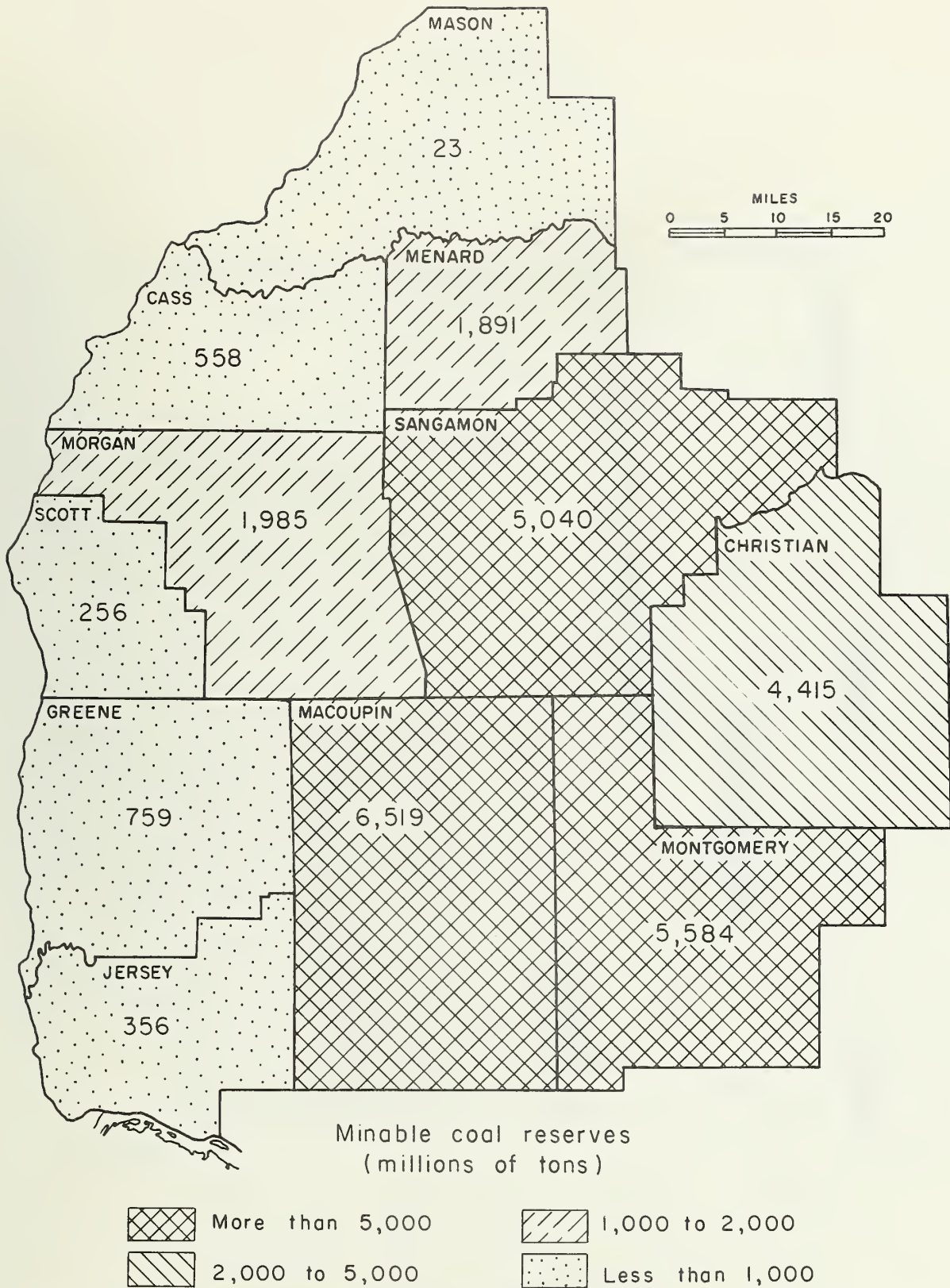


Fig. 3 - Movable coal reserves in the Springfield Region. Data for county totals are from Cady et al. (1952) with adjustments resulting from more recent strippable coal studies by Smith (1961).

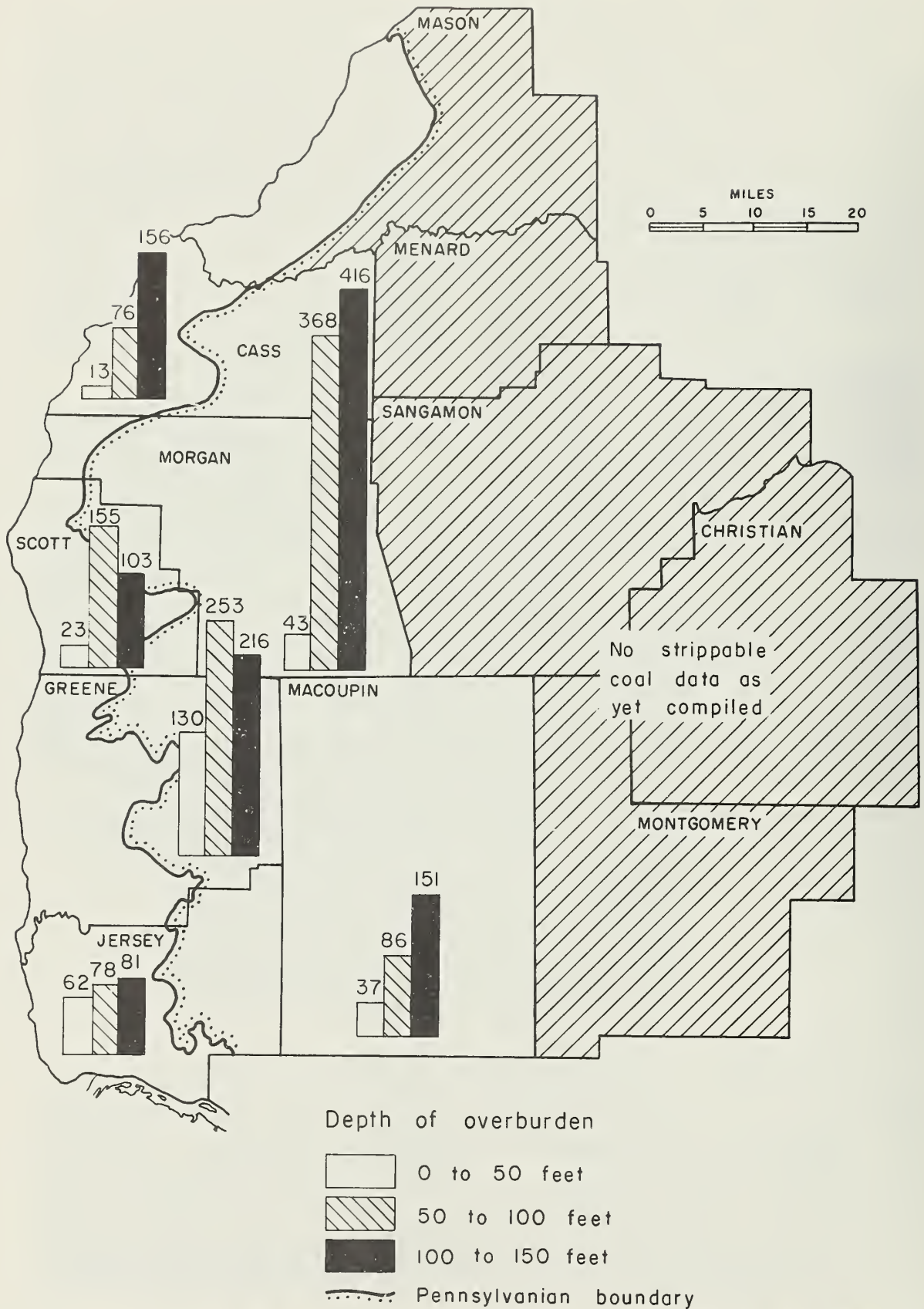


Fig. 4 - Strippable coal reserves in the Springfield Region. Numbers at top of bars indicate the coal reserves in the ground in millions of tons at various depth ranges.

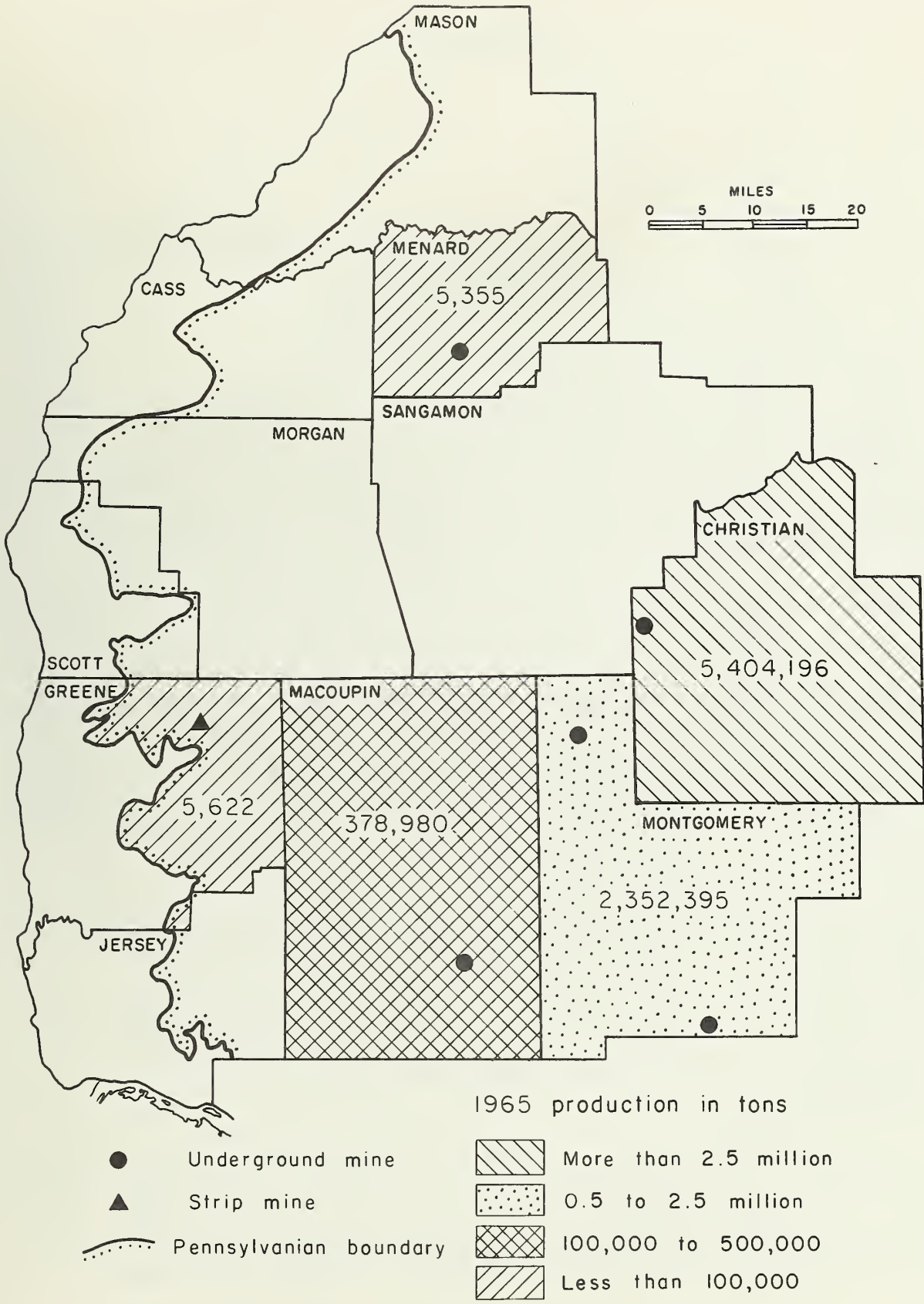


Fig. 5 - Coal mines and production in the Springfield Region, 1965.

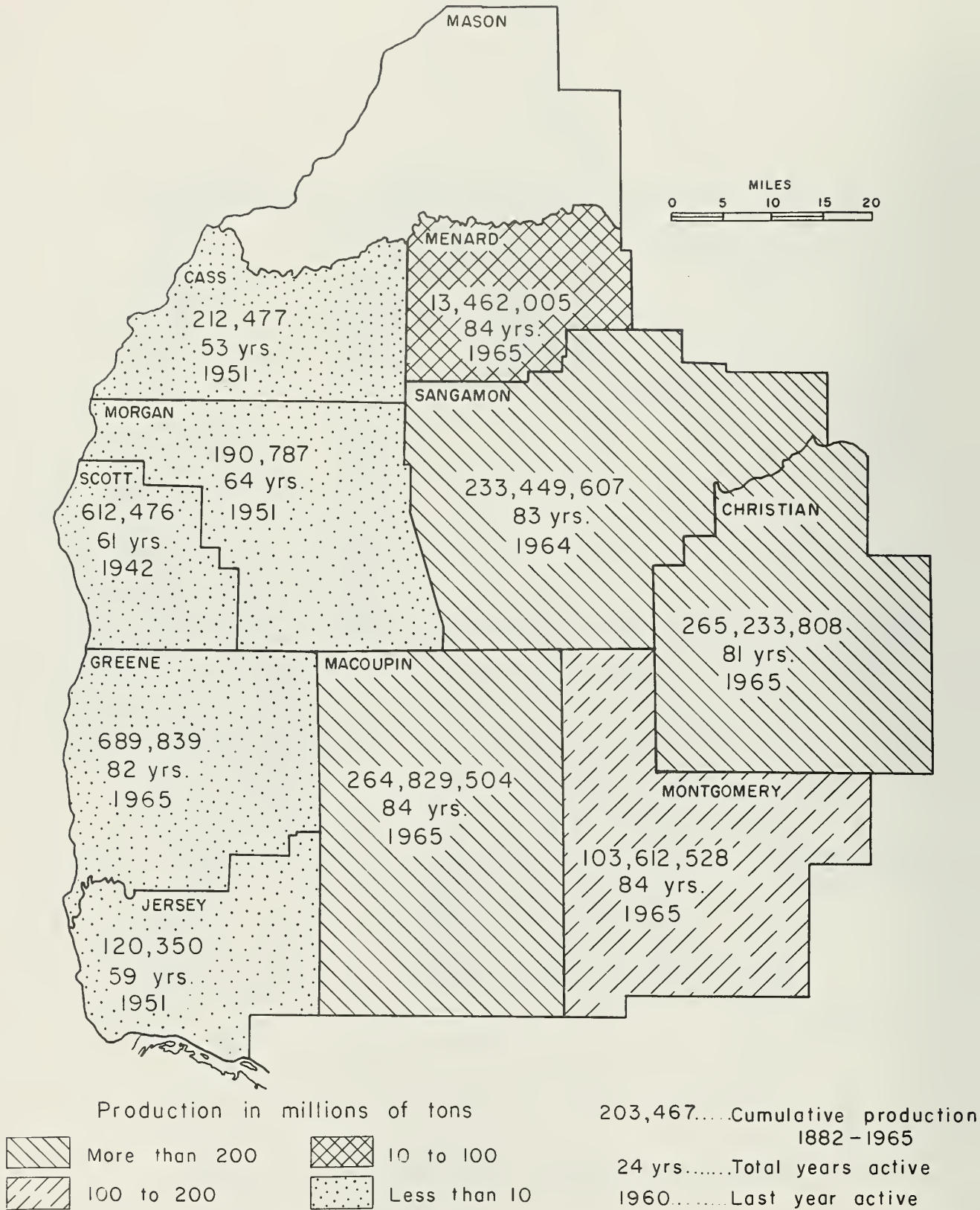


Fig. 6 - Cumulative coal production in the Springfield Region.



Fig. 7 - Annual coal production in the Springfield Region, 1948 to 1965. Practically all of the production came from underground mines; less than 1 percent was strip mined.

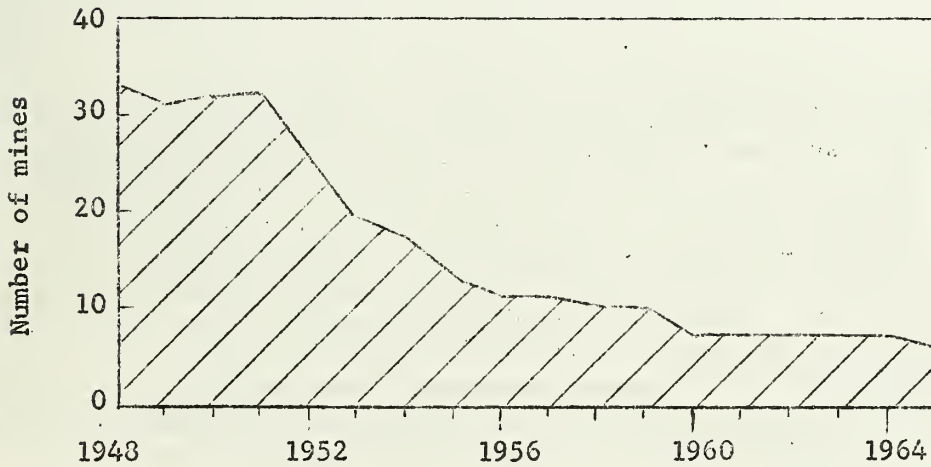


Fig. 8 - Number of operating coal mines in the Springfield Region, 1948 to 1965.

TABLE 3 - COAL VALUES IN THE SPRINGFIELD REGION*

County	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Christian	3.14	3.42	3.52	W	W	W	W	W	W	W	W
Greene	5.28	5.09	4.05	5.00	5.00	5.39	5.40	5.43	W	5.67	3.77
Macoupin	3.73	3.92	4.06	4.02	4.20	4.15	4.13	4.06	3.83	3.78	4.14
Menard	6.14	6.26	6.01	6.04	6.11	5.42	6.05	6.04	6.19	W	W
Montgomery	4.09	4.26	W	W	W	W	W	W	W	W	W
Sangamon	5.49	3.20	W	W	W	4.50	4.50	5.00	W	4.41	---

State average	3.66	3.84	4.00	4.02	4.06	4.00	3.91	3.86	3.80	3.79	3.74

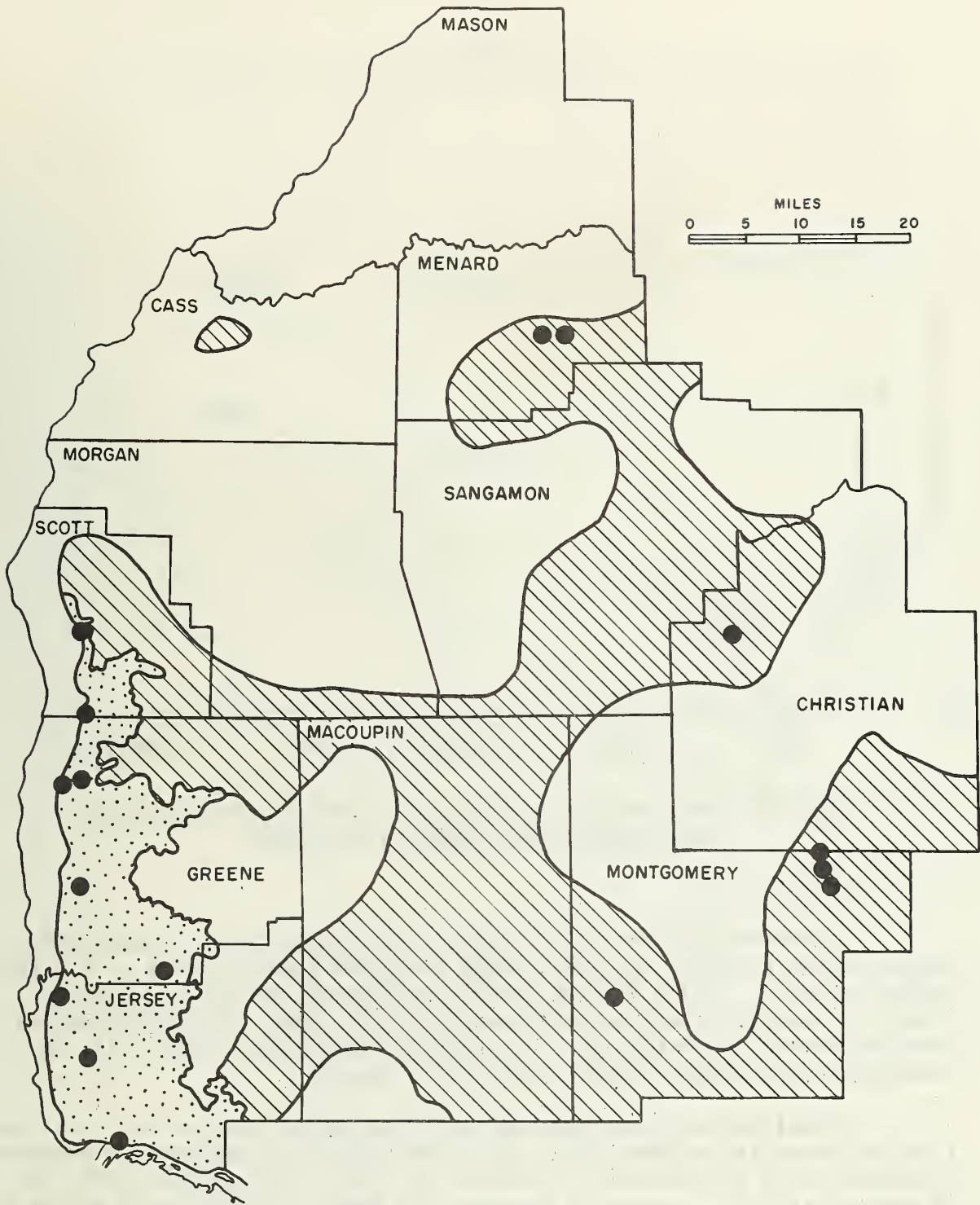
*Source: U. S. Bureau of Mines. Average value per ton = value received or charged for coal f.o.b. mines as reported to the U. S. Bureau of Mines. Includes a value for coal not sold but used by producers, such as mines fuel and coal coked, estimated at average prices that might have been received if such coal had been sold commercially.
W = Withheld to avoid revealing individual company data.

A general review of the limestone resources of the region can be found in the report by Lamar et al. (1956, p. 14-18, 24-25). Figure 9 indicates the distribution of limestone and dolomite resources in the Springfield Region.

Regional production and value of crushed and broken limestone and dolomite have grown rather steadily between 1955 and 1965, as can be seen in figure 10. Fourteen quarries in six counties reported in 1965 a combined production of 2.1 million tons, or 6.9 percent of the state stone production. Montgomery, Menard, and Greene Counties were the region's leading stone producers in 1965.

OIL AND GAS

The Springfield Region lies to the north and west of the main petroleum-producing area in Illinois and contains relatively few pools. The production that has been achieved has been for the most part concentrated in Christian County. A little production has come from Macoupin, Montgomery, and Sangamon Counties. The locations of the various oil and gas fields in the region are shown in figure 11. Production comes from various pay zones in the Pennsylvanian, Devonian, Silurian, and Mississippian sediments. The oil resources and possibilities in Illinois were discussed by Bell (1955). To date, all of the oil production from the Illinois Basin has come from rocks in the upper portions of the stratigraphic column. The possibilities for oil production in the deeper, older (Lower Ordovician and Cambrian) rocks were covered in a report by Bell et al. (1964).



Areas of outcrop and near-surface deposits



Scattered, thin limestones



Limestone, cherty limestone, locally dolomite or dolomitic limestone; shale in places.

● Quarry operation (active in 1965)

Fig. 9 - Stone resources and quarry operations in the Springfield Region. (Adapted from "Preliminary Map of Limestone Outcrops," compiled by Lamar and Schrode, 1950.)

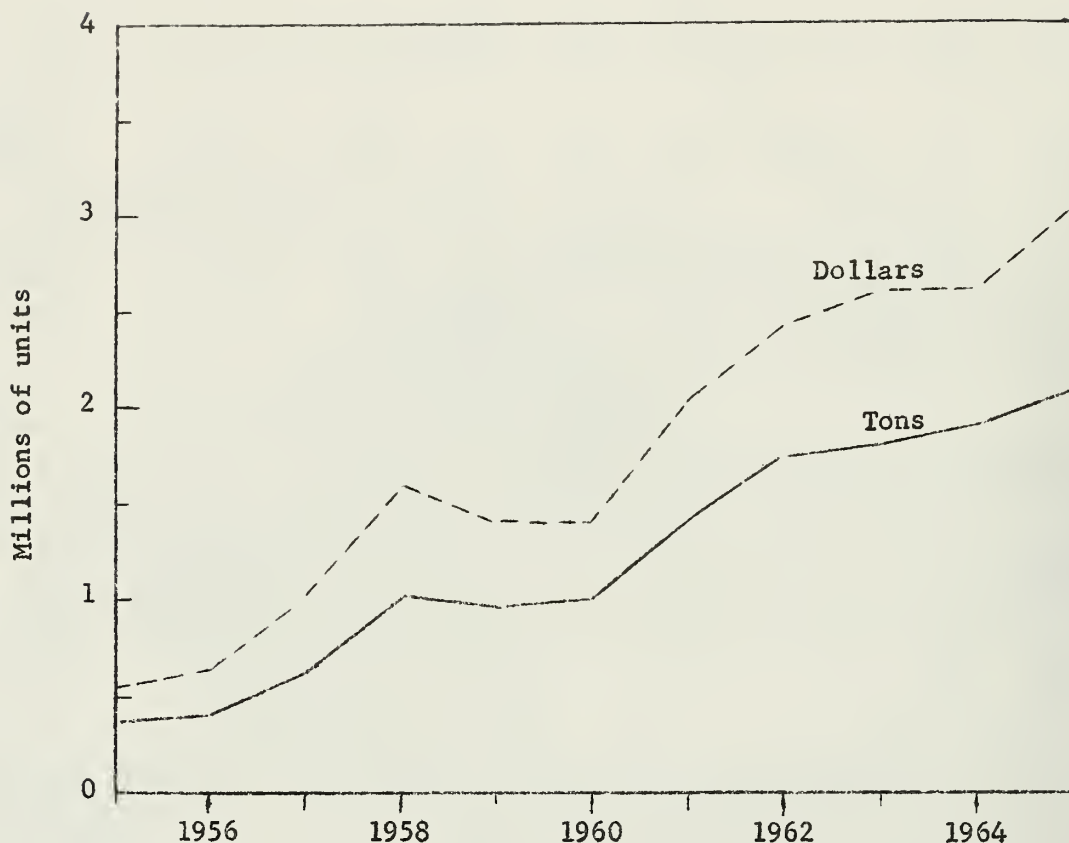


Fig. 10 - Production and value of crushed and broken stone in the Springfield Region, 1955-1965.

Between 1955 and 1959 crude oil production in the Springfield Region showed a slight increase, which since has been followed by a rather steady decline. Figure 12 is a graphic representation of the region's crude oil production and value between 1955 and 1965. Table 4 shows the 1965 production and value and the cumulative production (1888-1965) on a county-by-county basis for the Springfield Region.

Drilling activity has been variable in the past decade, but since 1959 has steadily declined (fig. 13). The highest percentages of successful producing wells drilled were 44 percent in 1954, 46 percent in 1958, and 44 percent in 1959. Secondary recovery has been undertaken in a modest way; in 1965 there were five active waterflood operations in the region.

CLAY AND CLAY PRODUCTS

Pennsylvanian clays and shales occur widely in the Springfield Region. They supply the raw material base for a small clay products industry.

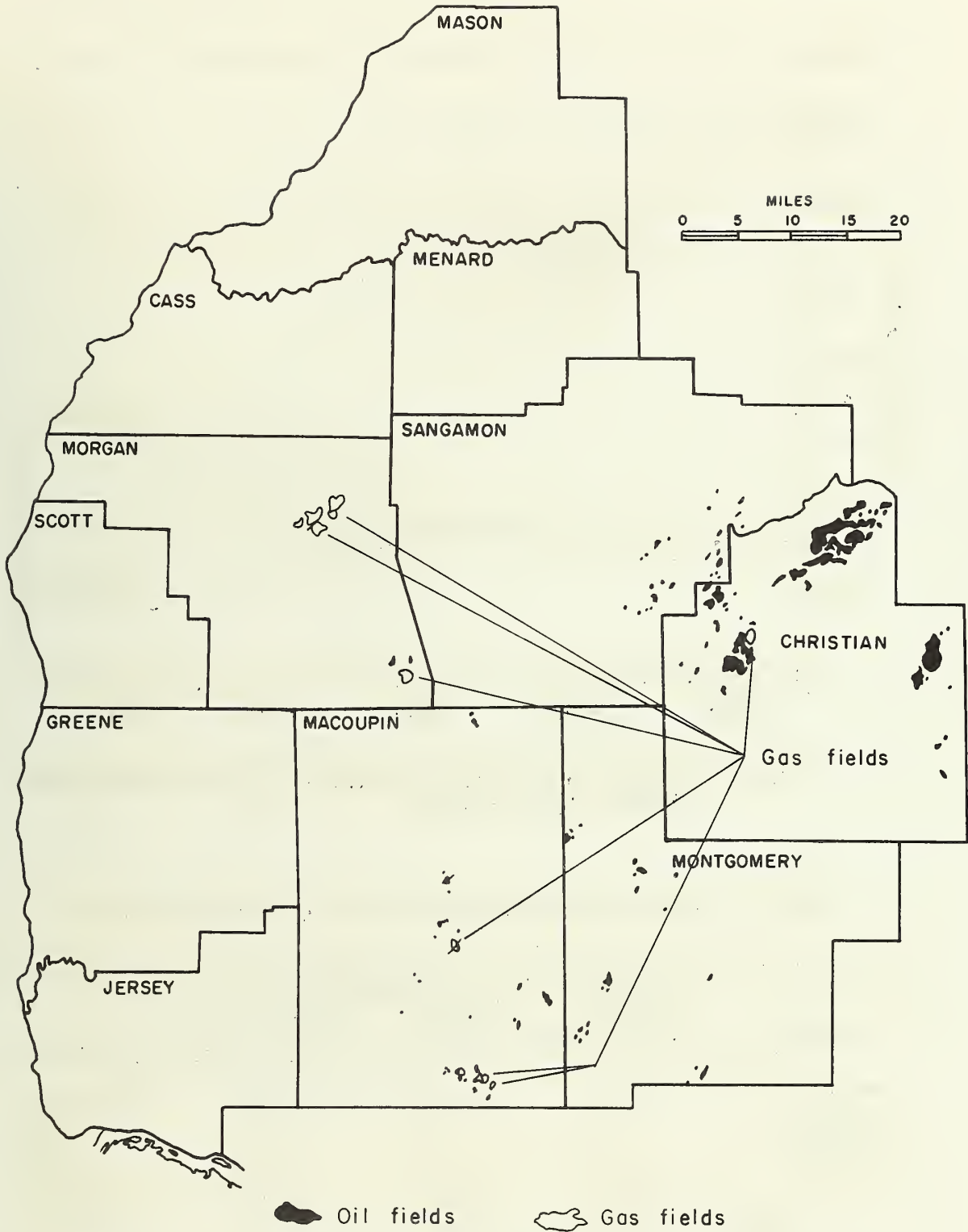


Fig. 11 - Oil and gas fields in the Springfield Region. (Data from Whiting et al., 1965.)

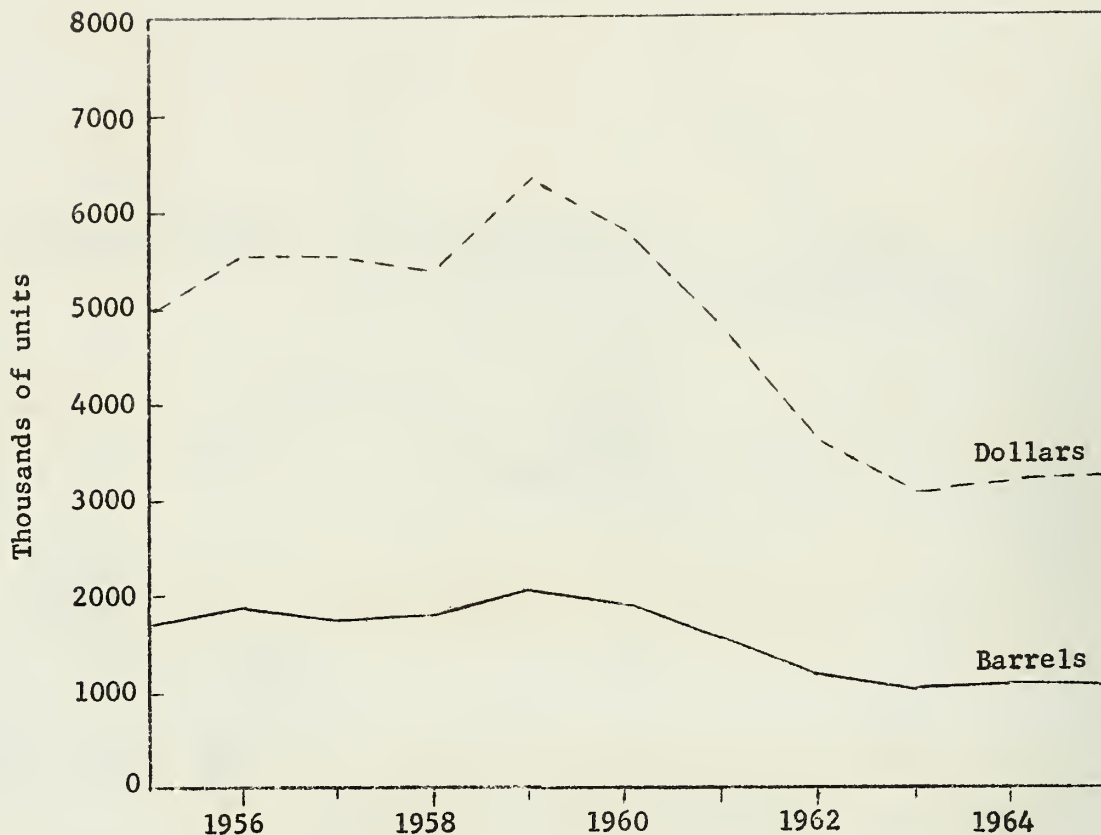


Fig. 12 - Value and production of crude oil in the Springfield Region, 1955 to 1965.

TABLE 4 - CRUDE OIL PRODUCTION STATISTICS FOR THE SPRINGFIELD REGION

County	Cumulative production (1888-1965)*	1965 production		1965 value [†]
		Thousands of barrels	Percent of state total	
Christian	20,951	887	1.39	\$2,598,910
Macoupin	210	7	0.01	20,510
Montgomery	109	2	---	5,860
Sangamon	1,099	219	0.34	641,670
Total	22,369	1,115	1.74	\$3,266,950

* In thousands of barrels.

† Average price estimated at \$2.93 per barrel.

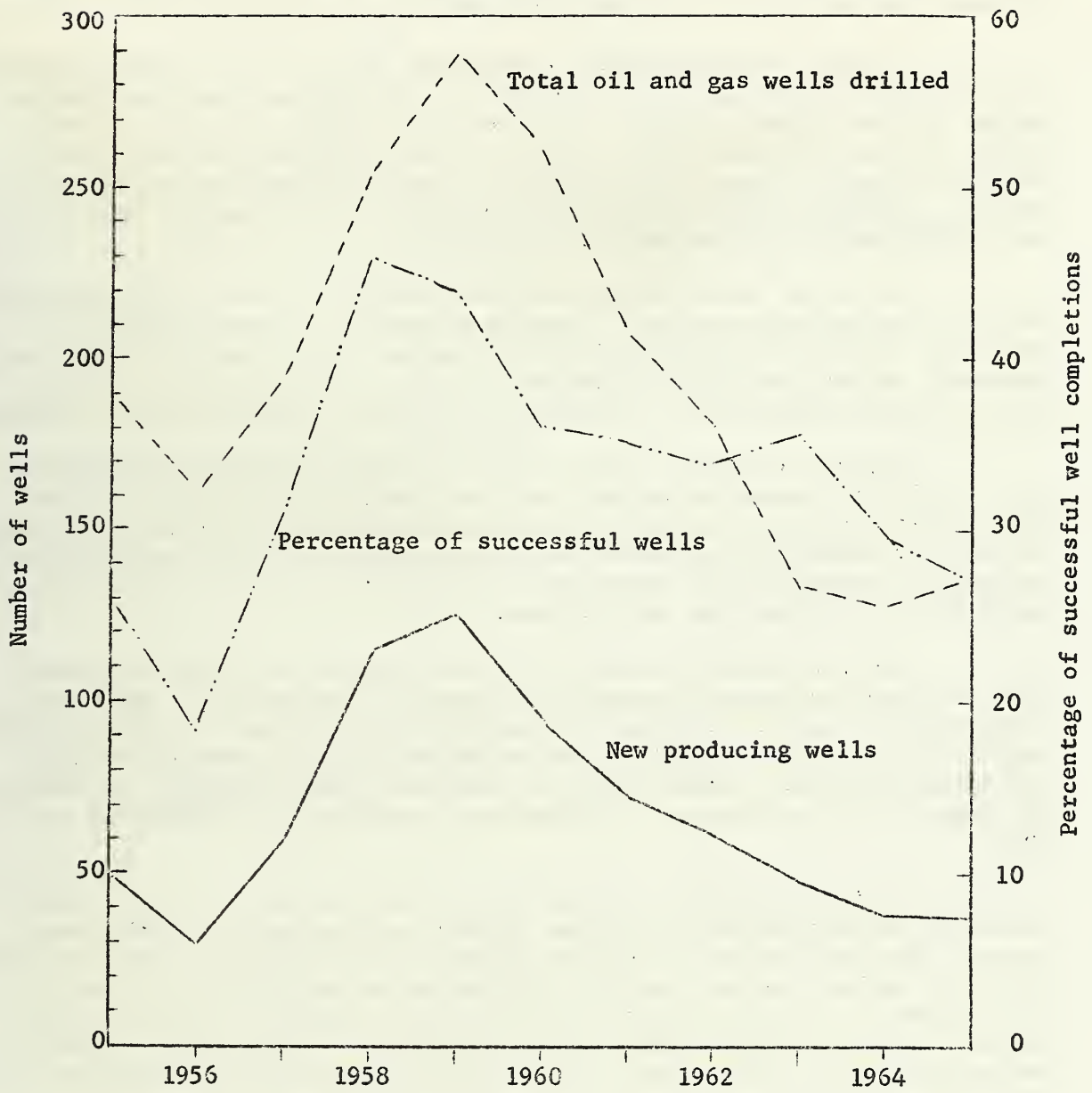


Fig. 13 - Drilling activity in the Springfield Region, 1955 to 1965.

A number of clay and shale samples from the area have been collected and tested and the results were published by Parmelee and Schroyer (1921), White (1960), White and Lamar (1960), and Parham and White (1963). Figure 14 shows the localities from which samples were collected.

Figure 15 indicates the approximate limits of the various grades of "strippable" refractory clay deposits in the region. The term "strippable" is used rather loosely to indicate areas where the ratio of overburden to clay thickness falls within the generally accepted limits of present mining practices and economics. More detailed information on locations, tonnages, and types of clay resources can be obtained from Illinois Geological Survey personnel.

White and Lamar (1960) compiled results of tests of 125 samples of clay that had been run over a period of years. Of these samples, 11 were from localities in the Springfield Region. Their suggested uses were extremely varied, but the most commonly listed ones were for structural clay products, drain tile, flower pots, sewer pipe, and refractory products.

Parham and White (1963) listed the results obtained from 66 samples of clay collected in southern and southwestern Illinois, 24 of them from localities in the Springfield Region. Test results showed one or more of the clay samples suitable for use in sewer pipe, pottery, refractories, stoneware, structural clay products, flower pots, drain tile, flue liners, terra cotta, bonding clay, and fillers.

New construction methods requiring lighter building materials have increased the market demand for lightweight aggregates. The shale resources of Illinois suitable for such use were discussed by White (1960) and his report includes evaluations of shales from six counties in the Springfield Region. Poston Brick and Concrete Products Company of Springfield was the only producer of lightweight aggregates in the region in 1965.

Illinois has been an important producer of clay products, manufacturing between 50 and 60 million dollars worth annually for the past decade. However, the clay products industry in the region covered in this report is rather limited, its 1965 production valued at \$2.4 million, or 4.6 percent of the state total. In 1965, three companies reported production of clay products such as face brick, sewer pipe, fireclay brick, and modeling clay (figure 16). The value of clay products production in the Springfield Region between 1955 and 1965 is shown in figure 17.

SAND AND GRAVEL

Sand and gravel deposits are important natural resources that occur in many places in Illinois. They are, with the exception of a few deposits located in extreme southern and western Illinois, related directly or indirectly to past glacial activity. The Illinoian and Wisconsinan glaciations produced the most important economic sand and gravel deposits in the state. The origin of these deposits was explained by Lamar and Willman (1958). Figure 18 shows the location of known sand and gravel resources in the Springfield Region.

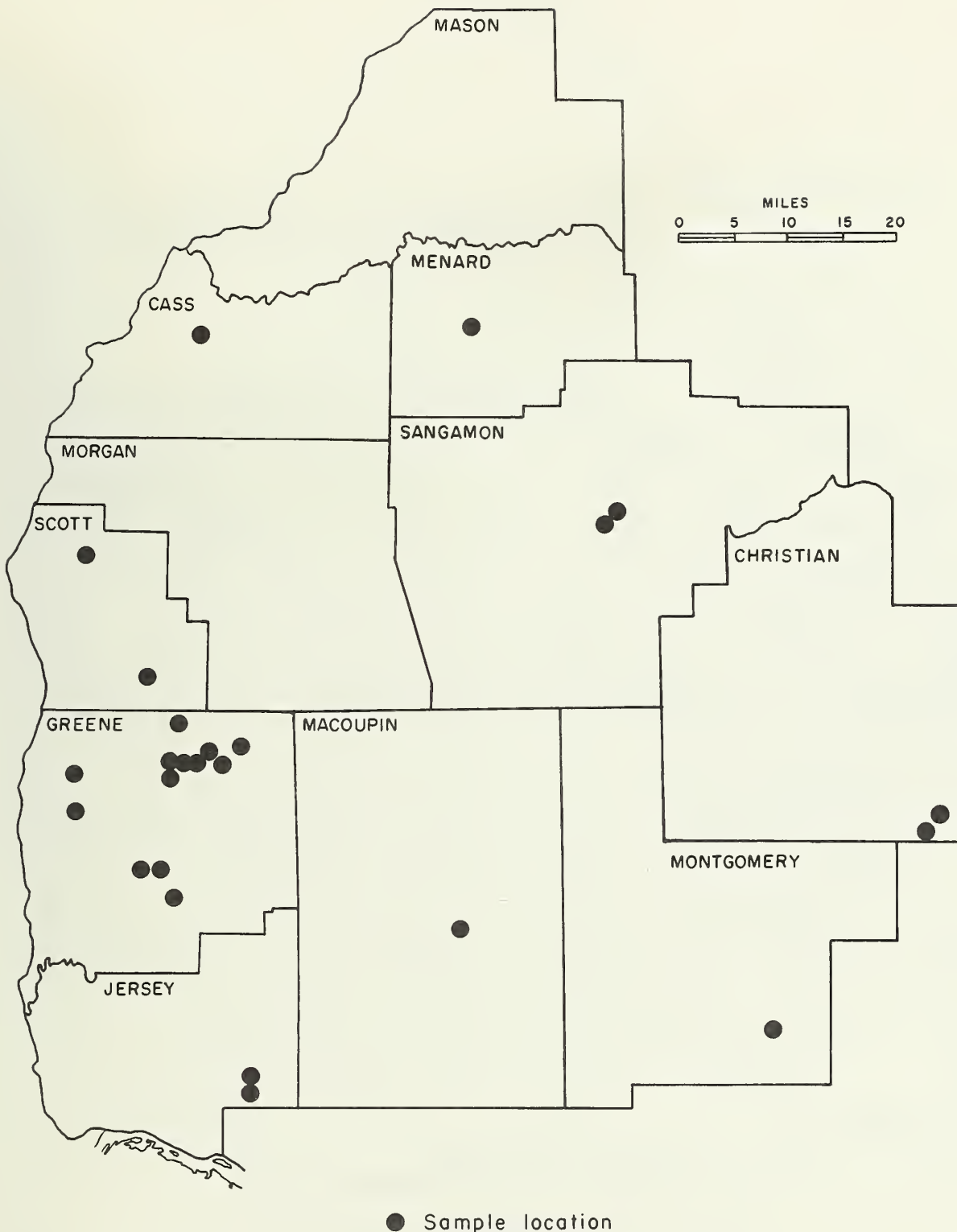


Fig. 14 - Locations from which clay samples were taken in the Springfield Region. (Data from Parmelee and Schroyer, 1921, White, 1960, White and Lamar, 1960, and Parham and White, 1963.)

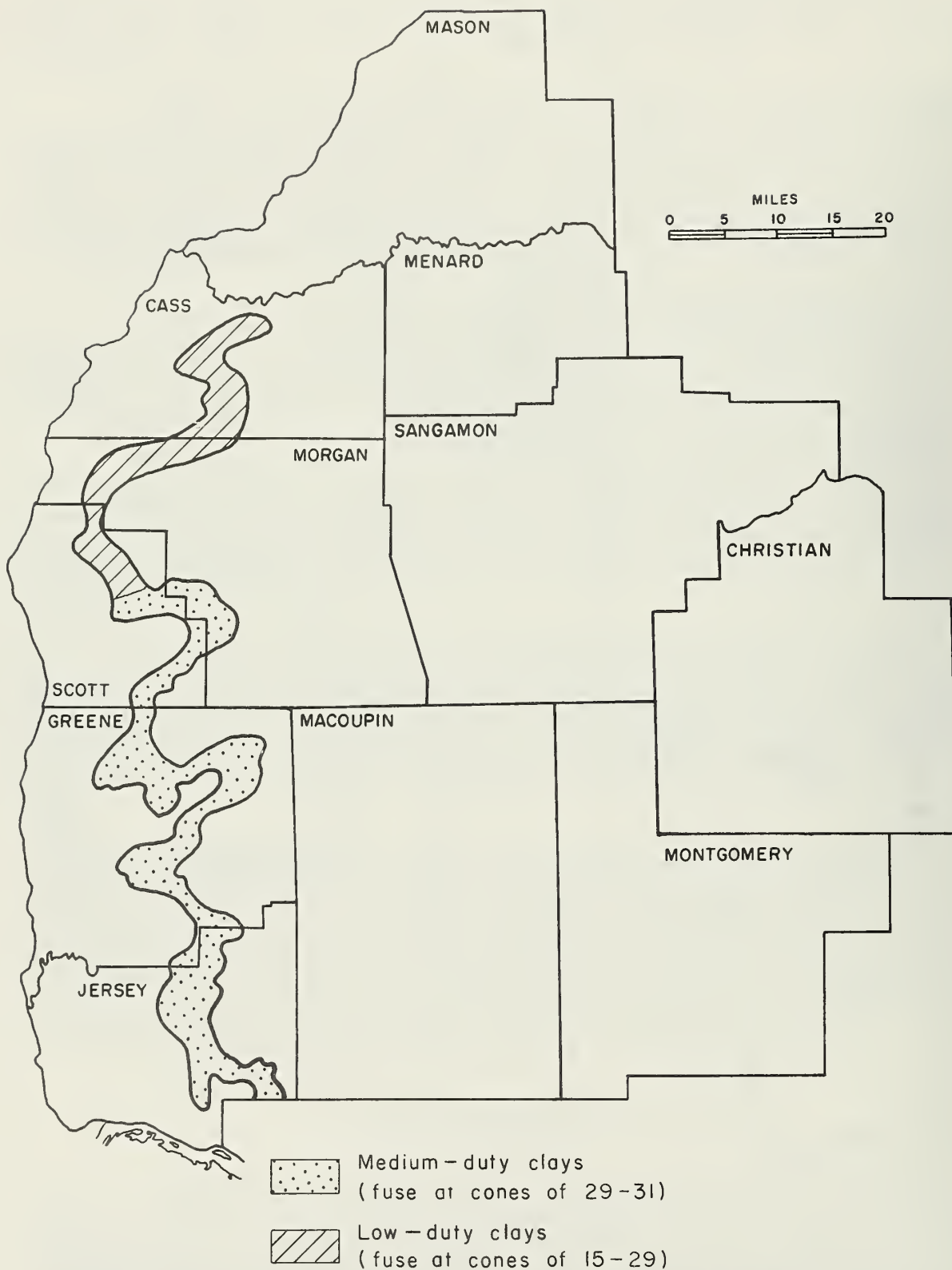


Fig. 15 - Strippable refractory clays in the Springfield Region. (Data from White and O'Brien, 1964.)

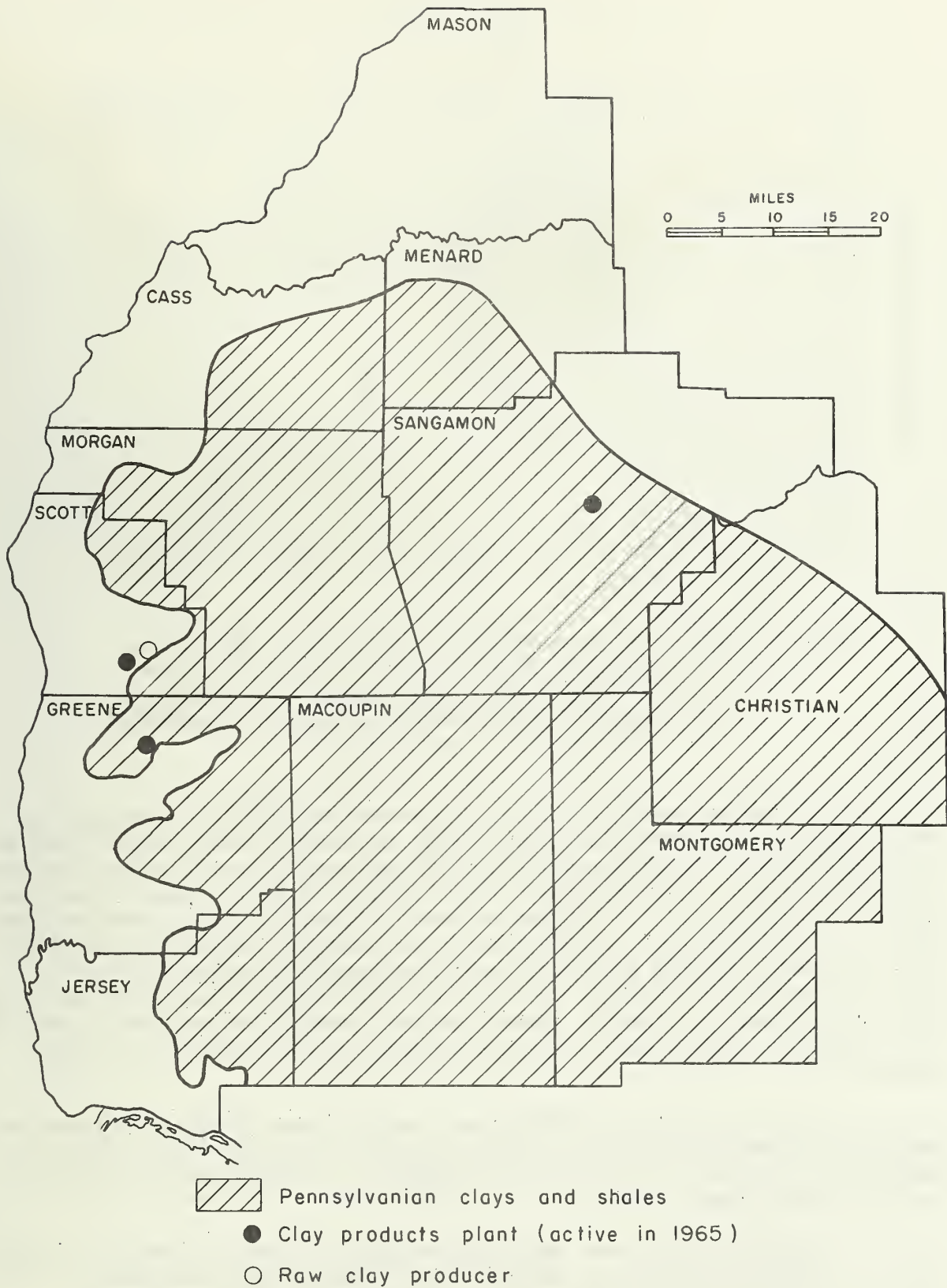


Fig. 16 - Clay resources and operations in the Springfield Region.
(Data from White and O'Brien, 1964.)

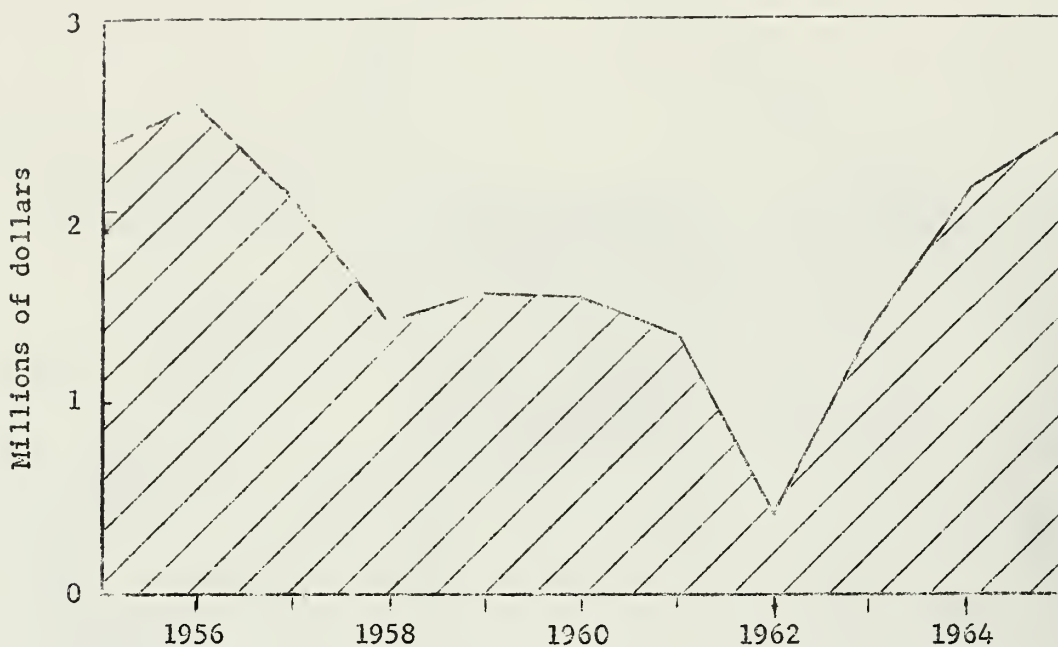


Fig. 17 - Value of clay products production in the Springfield Region, 1955 to 1965, as reported to the Illinois State Geological Survey by the producers; the returns for some years may not be complete. The 1962 figure is questionable.

It is not possible to give any meaningful data on reserves. As sand and gravel are low-value commodities, the market area in which they can compete is usually sharply restricted. Transportation costs often represent a greater portion of the delivered price than the initial value of the raw material at the pit site. Because of this, a deposit usually must be quite close to the market area to be economic. A study of nationwide transportation patterns has shown that rail hauls for aggregates average 80 to 90 miles; water hauls average 30 to 35 miles; truck hauls, accounting for about 80 percent of sand and gravel transportation, probably average well under 30 miles (Davidson, 1965, p. 1). However, these figures average out widely varying local conditions.

Annual regional production and value of sand produced between 1955 and 1965 are shown in figure 19. Four companies reported sand production that year and their total production amounted to 579,000 tons, or about 4.5 percent of the state total.

Regional production and value of gravel produced between 1955 and 1965 are shown in figure 20. In 1965 four companies reported gravel production totaling 168,000 tons, or about 1 percent of the state total.

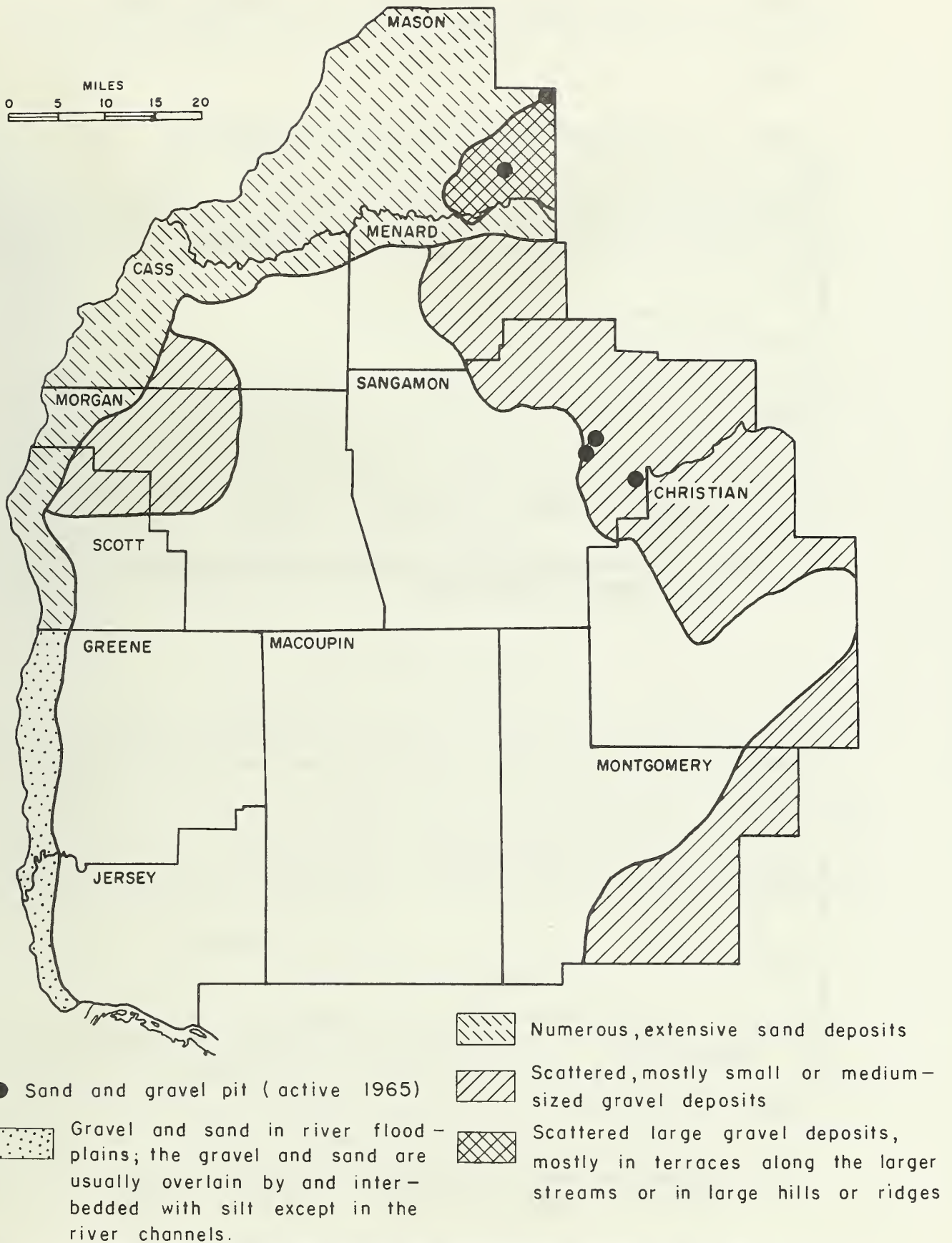


Fig. 18 - Sand and gravel resources and operations in the Springfield Region.
(From a map of sand and gravel resources of Illinois by G. E. Ekblaw.)

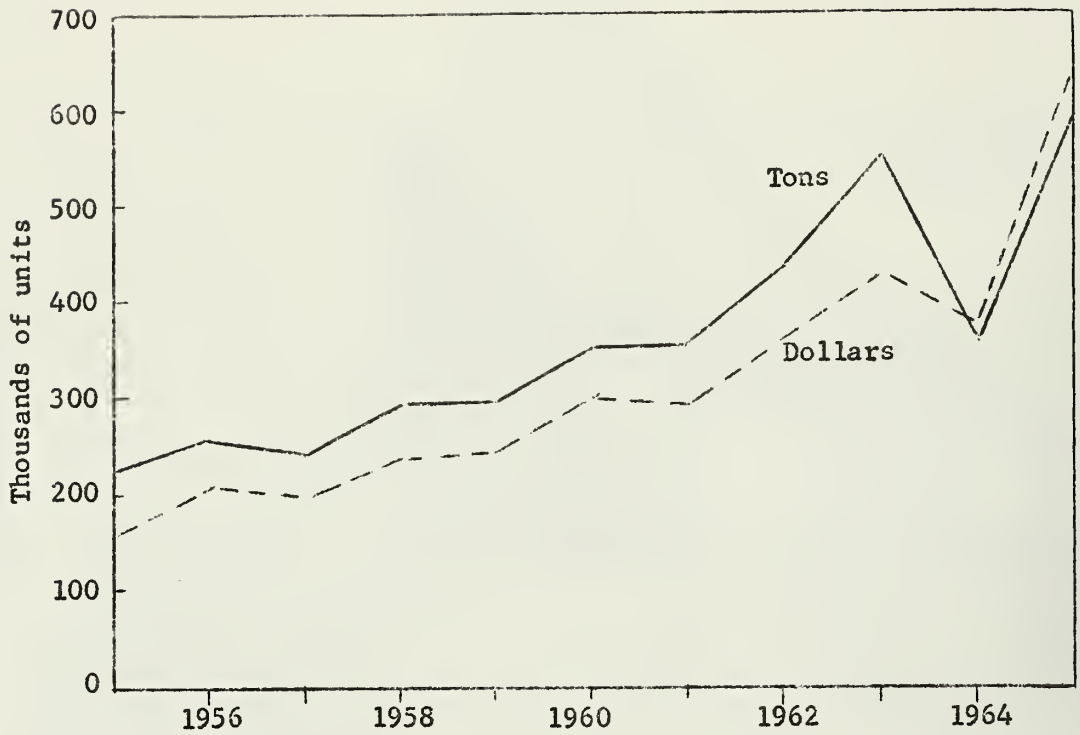


Fig. 19 - Sand production and value in the Springfield Region, 1955 to 1965.

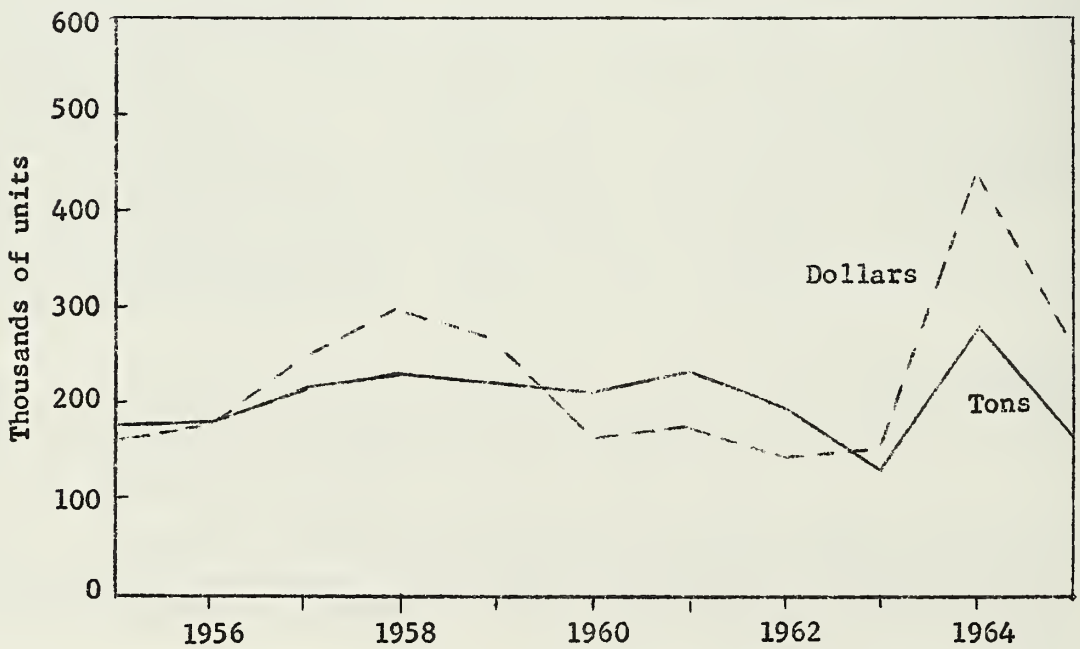


Fig. 20 - Gravel production and value in the Springfield Region, 1955 to 1965.

Some production of natural bonded molding sand was reported until 1964 from a pit near the town of Mason City in Mason County, but this operation has since closed down.

UNDEVELOPED MINERALS OF POTENTIAL IMPORTANCE

Illinois possesses a number of mineral deposits that, at present, are not being exploited. The low grade of the material and/or the high processing costs have made their exploitation uneconomic. A brief discussion of these resources and the problems associated with their use is given below.

Oil Shale

Publications dated as early as 1870 reported the presence of oil in certain shales in Illinois, but no comprehensive testing and evaluation of these shales was carried out until 1956. At that time members of the staff of the Illinois Geological Survey collected and tested 114 samples taken from localities in 41 counties (Lamar, Armon, and Simon, 1956). Ten of the samples were collected from localities in the Springfield Region (fig. 21). However, only two of the samples indicated yields of more than 15 gallons per ton of shale, and the sample beds in both cases were less than 3 feet thick. As there are vast reserves of thicker and richer oil shales in the western United States (Colorado, Wyoming, and Utah), the use of Illinois oil shales appears to be rather remote at this time.

Gypsum and Anhydrite

Gypsum and anhydrite are not known to crop out anywhere in Illinois, but both minerals have been encountered in wells drilled in the St. Louis Limestone of southern and central Illinois. The gypsum and anhydrite are interbedded with limestone and with each other. Deposits of this sort occur in a north-south belt in the eastern half of the Springfield Region at depths ranging from 800 to 1600 feet. The thickest evaporite sequence attains 40 feet, north of the town of Hillsboro in Montgomery County, and includes both gypsum and anhydrite. Additional information concerning these resources was reported by Saxby and Lamar (1957).

Feldspar-Bearing Sands

Feldspar, an essential constituent in the manufacture of glass, pottery, and other ceramic materials, is a mineral component of many Illinois sand deposits. In 1965 Illinois was the third largest domestic consumer of feldspar, using 66,160 tons, all of which had to be imported from other states as there was no Illinois production (U. S. Bureau Mines, 1966, p. 4). At present, the feldspar is imported from Colorado, South Dakota, and North Carolina, and, therefore, substantial freight costs are involved. For this and other reasons, research has been directed toward determining whether

certain Illinois sands might be beneficiated to produce a feldspar concentrate of acceptable grade that could supply all or part of the state's needs more cheaply.

Figure 22 gives the locations of the sand samples tested by Willman (1942) and Hunter (1965) for feldspar content. Ten samples of feldspar-bearing sands—eight from the extensive dune sands in Mason and Cass Counties and two from the Illinois River—were collected by Willman. Hunter restudied two of Willman's sample locations (fig. 22). Sample 41, taken near Mason City in Mason County, yielded the highest content of both potash and soda-lime feldspar.

The iron oxide content is a critical factor in the use of feldspar for ceramic and glass purposes. The maximum amount of iron oxide (Fe_2O_3) allowed in the feldspar for use in flint (clear) glass is 0.05 percent. In amber glass, 0.50 percent is allowed (U. S. Bureau Mines, 1965b, p. 322). Hunter (1965), after studying the mode and occurrence and amount of iron oxide in the feldspars of his sand samples, found that the sands contain potash feldspar, soda-lime feldspar, and feldspathic (feldspar-bearing) rock fragments, and that the potash feldspar contains less iron oxide than either of the other two forms. When the feldspars were treated with acid in the laboratory, their iron oxide content was reduced to levels acceptable for amber glass use. Treated samples of potash feldspar contained from 0.10 to 0.31 percent iron oxide, whereas the treated soda-lime feldspar had from 0.16 to 0.56 percent.

Further work on beneficiation of feldspar-bearing sands in Illinois is being carried out by personnel in the Chemical Engineering Section of the Illinois Geological Survey. It is hoped that an economic process can be developed that will produce a feldspar concentrate of a grade high enough to be acceptable for use in flint (clear) glass manufacture.

Pyrite (Coal Brasses)

All coals contain sulfur in varying amounts; this sulfur occurs in three forms—as pyrite, in organic combination, and as sulfates. Much of the pyrite, known as coal "brasses," is removed during the cleaning process. Because of a lack of market, they are discarded. In 1952 when sulfur was scarce on the world market, Voskuil (1952) prepared a study on the market outlook for sulfur recoverable from coal. However, during the late 1950's and early 1960's world sulfur production tended to exceed demand. In 1961 and 1962, production outstripped demand by a million tons, and prices were depressed to \$20 per ton. By 1965, a shortage had developed and the prices were up to \$31 per ton (Mining Journal, 1966, p. 23). As the shortage has continued and prices rose further in 1966, it may become economic to exploit coal brasses as an alternative source of sulfur.

New air pollution control regulations that may require more complete removal of sulfur from coal and the possibility of offsetting recovery costs by selling by-product sulfur and sulfuric acid are two other incentives for investigating the feasibility of such operations. Important technical problems remain to be overcome before recovery of pyrite becomes economic.

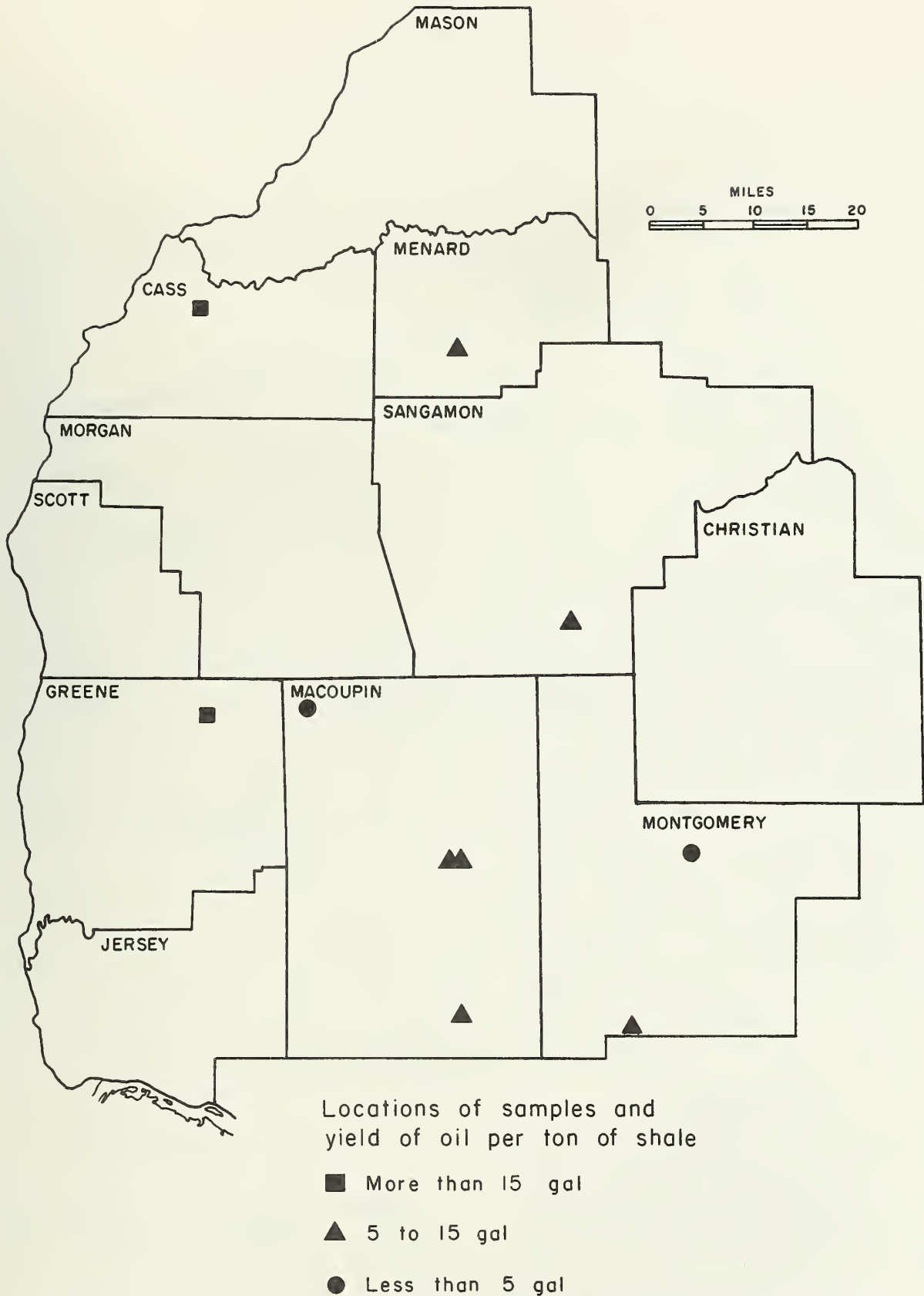
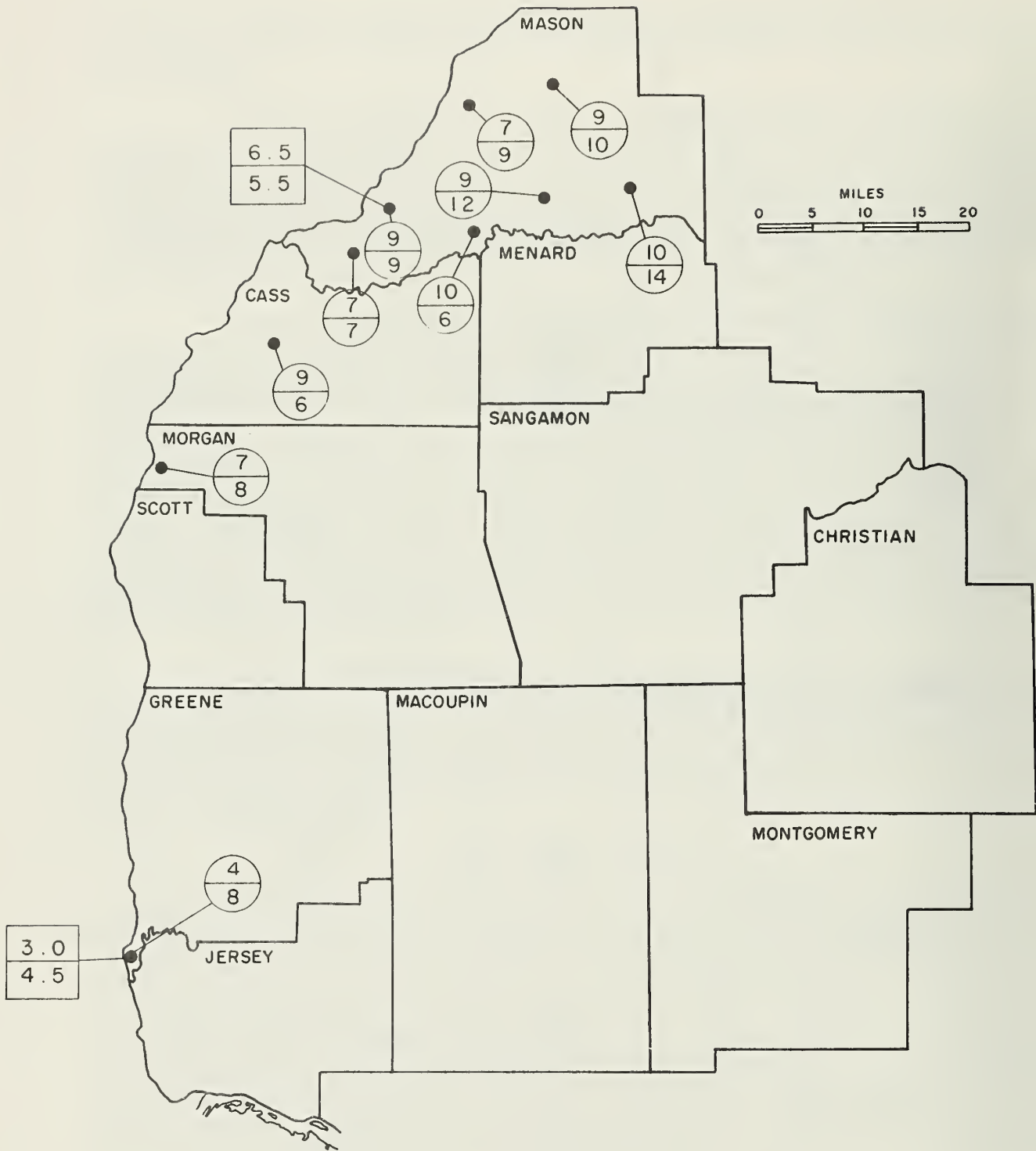


Fig. 21 - Locations from which oil shale samples were taken in the Springfield Region. (Lamar, Armon, and Simon, 1956.)



Percentage of potash feldspar (natural) in the -8 +270 mesh fraction*
Percentage of soda-lime feldspar in the -8 +270 mesh fraction (natural)*

Percentage of potash feldspar (natural) in the -35 +200 fraction of the sand sample
Percentage of soda-lime feldspar (natural) in the -35 +200 me fraction of the sand sample

Fig. 22 - Feldspar-bearing sands in the Springfield Region. Sample locations and results of tests (*Willman, 1942; †Hunter, 1965.)

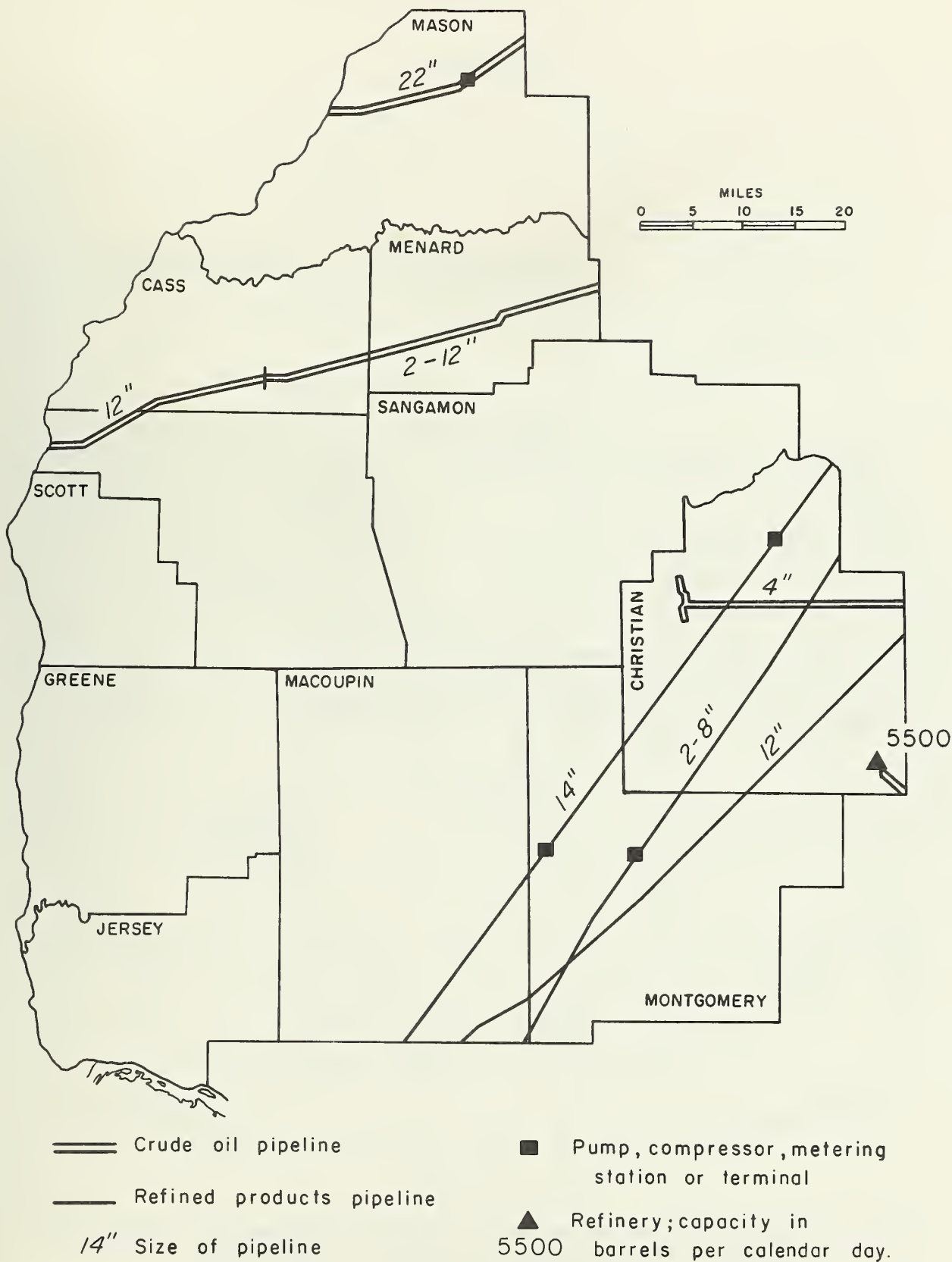


Fig. 23 - Crude oil and refined petroleum products pipelines in the Springfield Region. (Data from Meents and Bell, 1961.) Refinery capacity figures from Oil and Gas Journal, 1966.

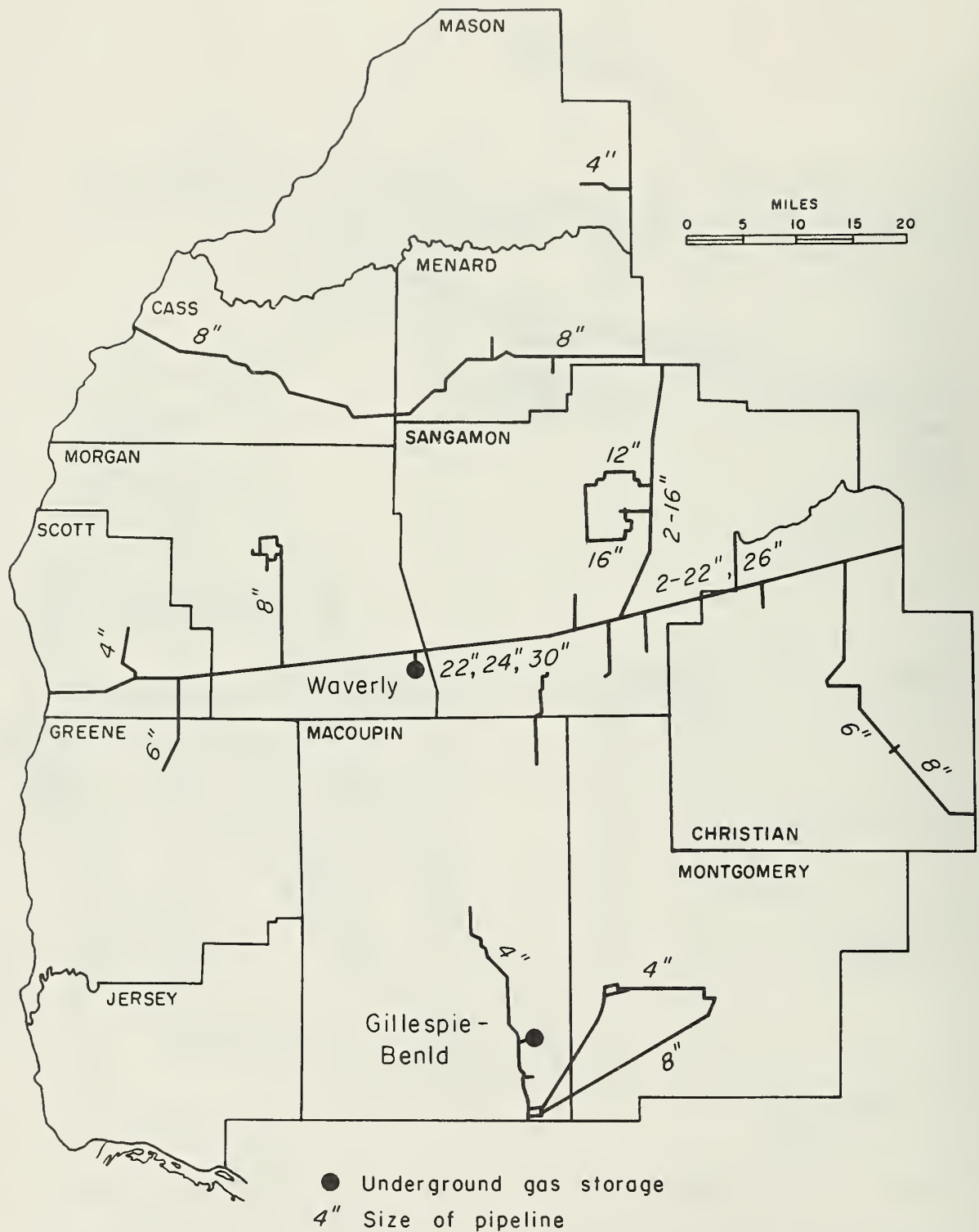


Fig. 24 - Natural gas pipelines and storage facilities in the Springfield Region. (Data from Meents and Bell, 1961.)

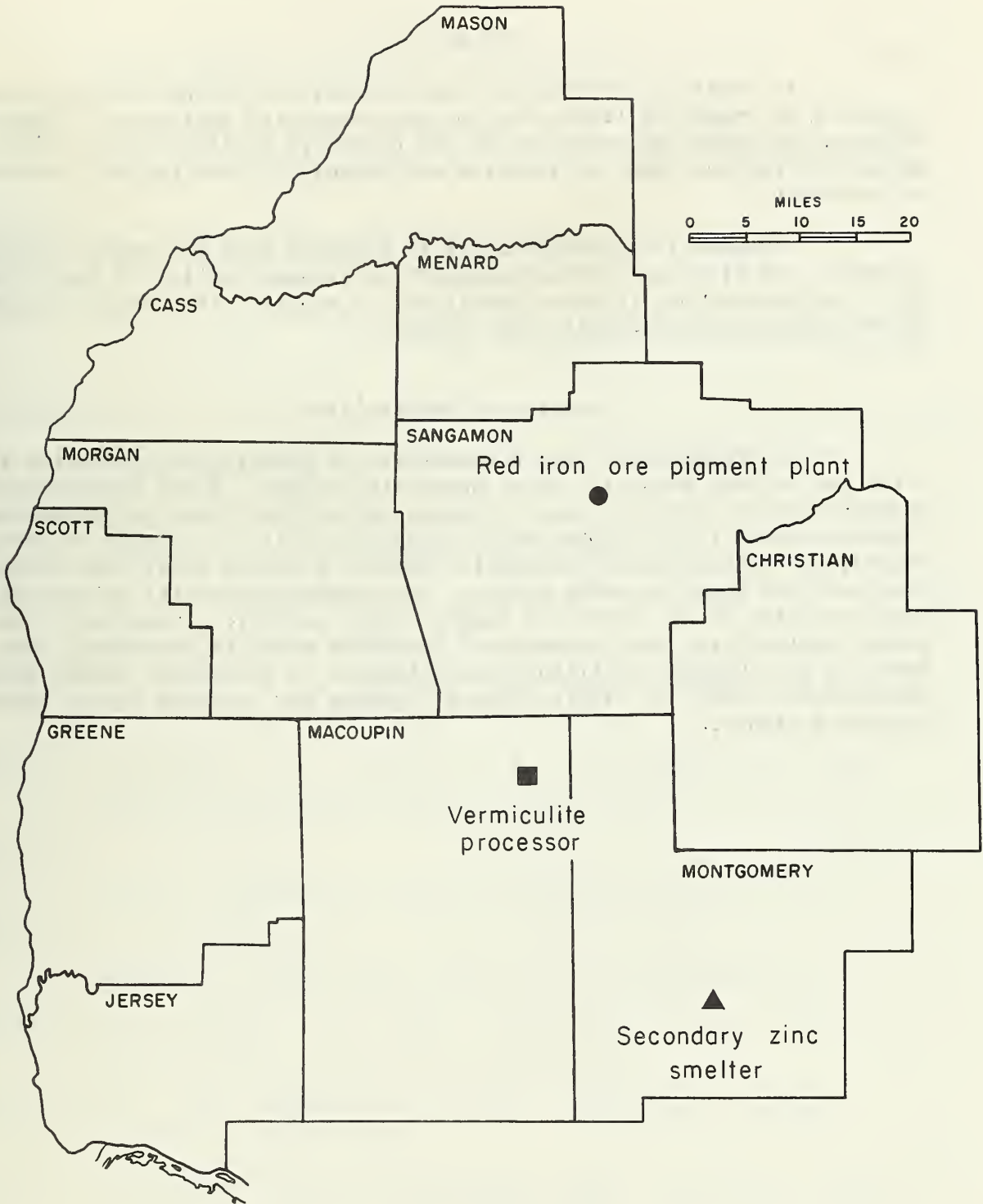


Fig. 25 - Mineral and metal processing facilities in the Springfield Region.

TRANSPORTATION AND PROCESSING FACILITIES

Oil and Gas

In addition to production facilities, the Springfield Region has a variety of crude oil transportation and processing facilities. Figure 23 shows the locations and sizes of the crude oil pipelines, the refined products pipelines, and the location and capacity of the region's single oil refinery.

Although little natural gas is produced from the area, there are extensive gas pipelines and underground gas storage facilities there (fig. 24). The natural gas in these facilities is supplied from fields located in the Southwestern and Gulf Coast states.

Metals and Nonmetallics

The Springfield Region possesses, in addition to production facilities for nonfuel minerals, three processing plants. Tamms Industries Company produces natural red iron oxide pigments at its plant near Springfield in Sangamon County (U. S. Bureau Mines, 1965a, p. 371). At Girard in Macoupin County, the International Vermiculite Company produces exfoliated vermiculite from material mined in other states. The processed material is used chiefly for insulation (U. S. Bureau of Mines, 1965a, p. 367). A secondary zinc plant (smelter) for the treatment of zinc-base scrap is operated by the American Zinc Company of Illinois at Hillsboro in Montgomery County (U. S. Bureau Mines, 1963, p. 1320). Figure 25 shows the location of the above-mentioned plants.

REFERENCES

- Bell, A. H., 1955, Oil resources and possibilities in Illinois: Illinois Geol. Survey Illinois Petroleum 72, 12 p.
- Bell, A. H., Atherton, Elwood, Buschbach, T. C., and Swann, D. H., 1964, Deep oil possibilities of the Illinois Basin: Illinois Geol. Survey Circ. 368, 38 p.
- Cady, G. H., et al., 1952, Movable coal reserves in Illinois: Illinois Geol. Survey Bull. 78, 138 p.
- Clegg, K. E., 1961, Subsurface geology and coal resources of the Pennsylvanian System: Sangamon, Macon, Menard, and Parts of Christian and Logan Counties: Illinois Geol. Survey Circ. 312, 28 p.
- Davidson, E. K., 1965, Are the sand and gravel reserves of the United States adequate for future needs?: Natl. Sand and Gravel Assoc. Gen. Public Relations Pub. PR 018, 4 p.
- Ekblaw, George E. [undated], Map of sand and gravel resources of Illinois: Illinois Geol. Survey unpub. map on open file.
- Hunter, R. E., 1965, Feldspar in Illinois sands: A further study: Illinois Geol. Survey Circ. 391, 19 p.
- Lamar, J. E., Armon, W. J., and Simon, J. A., 1956, Illinois oil shales: Illinois Geol. Survey Circ. 208, 22 p.
- Lamar, J. E., Machin, J. S., Voskuil, W. H., and Willman, H. B., 1956, Preliminary report on portland cement materials in Illinois: Illinois Geol. Survey Rept. Inv. 195, 34 p.
- Lamar, J. E., and Schrode, R. S., 1950, Preliminary map of limestone outcrops: Illinois Geol. Survey unpub. map on open file.
- Lamar, J. E., and Willman, H. B., 1958, Origin of Illinois sand and gravel deposits: Illinois Geol. Survey Ind. Min. Notes 8, 9 p.
- Meents, W. F., and Bell, A. H., 1961, Oil and gas industry in Illinois, Jan. 1, 1961: Illinois Geol. Survey map.
- Mining Journal, 1966, A shortage of sulfur: Mining Jour. [London], v. 266, no. 6804, p. 23.
- Oil and Gas Journal, 1966, U. S. Refineries: Where, capacities, types of processing: v. 64, no. 13, p. 151-176.
- Parham, W. E., and White, W. A., 1963, Buff-burning clay resources of southwestern and southern Illinois: Illinois Geol. Survey Circ. 352, 23 p.

- Parmelee, C. W., and Schroyer, C. R., 1921, Further investigations of Illinois fire clays: Illinois Geol. Survey Bull. 38, 149 p.
- Reinertsen, D. L., 1964, Strippable coal reserves of Illinois, Part 4—Adams, Brown, Calhoun, Hancock, McDonough, Pike, Schuyler, and the southern parts of Henderson and Warren Counties: Illinois Geol. Survey Circ. 374, 32 p.
- Saxby, D. B., and Lamar, J. E., 1957, Gypsum and anhydrite in Illinois: Illinois Geol. Survey Circ. 226, 26 p.
- Smith, W. H., 1957, Strippable coal reserves of Illinois, Part 1—Gallatin, Hardin, Johnson, Pope, Saline, and Williamson Counties: Illinois Geol. Survey Circ. 228, 35 p.
- Smith, W. H., 1958, Strippable coal reserves of Illinois, Part 2—Jackson, Monroe, Perry, Randolph, and St. Clair Counties: Illinois Geol. Survey Circ. 260, 35 p.
- Smith, W. H., 1961, Strippable coal reserves of Illinois, Part 3—Madison, Macoupin, Jersey, Greene, Scott, Morgan, and Cass Counties: Illinois Geol. Survey Circ. 311, 40 p.
- Smith, W. H., and Berggren, D. J., 1963, Strippable coal reserves of Illinois, Part 5A—Fulton, Henry, Knox, Peoria, Stark, Tazewell, and parts of Bureau, Marshall, Mercer, and Warren Counties: Illinois Geol. Survey Circ. 348, 59 p.
- Voskuil, W. H., 1952, Market outlook for sulfur recoverable from coal: Illinois Geol. Survey Circ. 177, 23 p.
- White, W. A., 1960, Lightweight aggregate from Illinois shales: Illinois Geol. Survey Circ. 290, 29 p.
- White, W. A., and Lamar, J. E. (compiled by), 1960, Ceramic tests of Illinois clays and shales: Illinois Geol. Survey Circ. 303, 72 p.
- White, W. A., and O'Brien, N. R., 1964, Illinois clay resources for lightweight ceramic block: Illinois Geol. Survey Circ. 371, 15 p.
- Whiting, L. L., Van Den Berg, Jacob, Lawry, T. F., and Mast, R. F., 1965, Petroleum industry in Illinois, 1964: Illinois Geol. Survey Illinois Petroleum 80, 115 p.
- Willman, H. B., 1942, Feldspar in Illinois sands: Illinois Geol. Survey Rept. Inv. 79, 87 p.
- Willman, H. B., 1943, High-purity dolomite in Illinois: Illinois Geol. Survey Rept. Inv. 90, 89 p.
- U. S. Bureau of the Census, 1961, U. S. Census of Mineral Industries—1958: U. S. Bur. Census, Commerce Dept., Washington, D. C.

- U. S. Bureau of the Census, 1966, U. S. census of mineral industries—1963:
U. S. Bur. Census, Commerce Dept., Washington, D. C.
- U. S. Bureau of Mines, 1963, 1962 minerals yearbook: v. 1, U. S. Bur. Mines,
Interior Dept., Washington, D. C., 1410 p.
- U. S. Bureau of Mines, 1965a, 1964 minerals yearbook: v. 3, U. S. Bur.
Mines, Interior Dept., Washington, D. C., 1152 p.
- U. S. Bureau of Mines, 1965b, Mineral facts and problems: U. S. Bur.
Mines Bull. 630, Interior Dept., Washington, D. C., 1113 p.
- U. S. Bureau of Mines, 1966, Feldspar, nepheline syenite, and aplite:
Preprint from the 1965 Bureau of Mines Minerals Yearbook, 8 p.

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