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**SOURCES OF LIMESTONE, GYPSUM, AND ANHYDRITE  
FOR DUSTING COAL MINES TO PREVENT  
EXPLOSIONS**

**BY**

**OLIVER BOWLES**



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## PREFACE

Although explosions do not cause annually the largest loss of life in coal mining, they are dreaded more than any other accidents by miners and operators. The first Federal appropriation, made in 1908, for the investigation of mine accidents was especially for the study of coal-mine explosions. The Bureau of Mines was established in 1910 as an agency for continuing this work. Until recently, the only generally known remedy for the dust menace, other than controlling possible sources of ignition, was watering to keep down coal dust, which is dangerous only when raised in the air, as by a "shot" of an explosive, the ignition of a pocket of gas, or the wreck of a "trip" of miné cars. The coal dust may then be ignited and cause an explosion disaster.

The bureau's investigations, however, have shown that watering is effective only when it reduces the coal dust to mud; that coal dust is hard to wet; and that water sprinkled along haulageways is dried rapidly in winter by the cold ventilating current, which carries little moisture when it enters a mine and takes up moisture by being raised to normal mine temperature (60° to 70° F.) in its passage inward. Daily watering throughout a mine was found to be necessary to keep the dust wet, and even then enough fine dry dust might remain on timbers and projections to propagate an explosion. Many disasters during the past three years in what were considered well-watered mines have shown that although theoretically watering is efficient, as a general remedy it is a failure. However, this does not preclude its usefulness in preventing the distribution of coal dust, by using sprays on the undercutters of mining machines and by automatic spraying of trips of cars to wash down the dust.

In 1892 the writer commented on the fact that northern Illinois longwall mines, where so much shale fell from the roof as to cover the coal dust, seemed immune from explosions. Similar facts had been noted in England by Atkinson, Garforth, and others. Garforth proposed artificial stone dusting of collieries as a means of preventing explosions. Alarmed by the Courrières disaster in France in 1906, which cost 1,100 lives, British mine owners in 1907 erected a gallery at Altofts and appointed a committee, with Garforth as chairman, to investigate the causes of explosions and to try rock dusting as a remedy. The British Government took over the investigations in 1911, and in 1915 moved the gallery to Eskmeals. As a result of these investigations the Explosions in Mines Committee recommended rock dusting as a remedy.

By 1920 the British authorities were so sure of the efficacy of the stone-dusting or rock-dusting method that they made its use obligatory in all but naturally wet bituminous mines. As some explosions occurred in the latter, they have since abolished all exceptions for bituminous mines. Anthracite mines are exempted, as true anthracite dust has been shown to be incapable of propagating an explosion.

The French Government has authorized the use of rock dusting as a remedy, and Germany, which heretofore has used water, is beginning to use rock dust.

The writer began testing the rock-dusting method for the Bureau of Mines at the Pittsburgh gallery in 1909, and later continued such testing in the bureau's experimental mine, with favorable results. Beginning in 1911 the bureau issued reports recommending rock dusting as an alternative to watering.

In spite of the bureau's recommendations, until 1924 rock dusting had been used in only a few mines in the United States. The coal-dust explosion disasters of 1921, 1922, and 1923 caused the bureau to decide definitely in favor of rock dusting. In cooperation with the British Mines Department on mine-safety research, Dr. R. V. Wheeler, in charge of the research branch, and Mr. Henry Walker, deputy chief inspector of mines, came to the United States in 1924. They greatly assisted the bureau investigators in conferences with mine operators at Pittsburgh and at other mining centers by describing the success of rock dusting in British mines—no widespread explosion disasters had occurred in mines that had been thoroughly rock dusted. The coal operators in various parts of the United States who had already become distrustful of generalized watering, took up the rock-dusting method with great energy and have already introduced it in many mines. Many more mines are planning to use it. Because hand distribution of rock dust is so expensive in this country, mining companies and manufacturers have developed efficient mechanical rock-dust distributors, and these are being rapidly introduced.

The National Council on Compensation Insurance recognizes the efficacy of the dusting method enough to allow credits for it. Up to July 15, 1924, 16 important coal-mining States had been named in the list of those that might benefit from such rate reduction. The credits range from 10 to 20 cents per hundred dollars of pay roll according to the explosion risk in the respective States. The expense of dusting may therefore be repaid in part by a reduction in insurance premiums.

In consequence of the recent impetus toward coal-mine dusting, the Bureau of Mines has received many inquiries regarding possible supplies of the most suitable dusting materials, such as limestone, gypsum, and anhydrite. Since the study of the sources of such materials is intimately related to the work of the Nonmetallic Minerals experiment station at Rutgers University, New Brunswick, N. J., the preparation of this report was undertaken by Dr. Oliver Bowles, superintendent of that station. The bureau hopes that the information offered will assist coal-mine operators materially in their search for incombustible mineral powders, and will encourage wide adoption of the dusting method.

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*Chief Mining Engineer.*

# SOURCES OF LIMESTONE, GYPSUM AND ANHYDRITE FOR DUSTING COAL MINES TO PREVENT EXPLOSIONS

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By OLIVER BOWLES

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## INTRODUCTION

### CAUSES OF DUST EXPLOSIONS IN COAL MINES

Accidental explosions in coal mines are due to various causes, but many of them can be directly attributed to coal dust; others that probably in no way depend on dust as a primary cause are propagated, greatly intensified, and made more disastrous by the presence of coal dust. The fact that coal dust in a bituminous mine will explode as a result of a fire-damp explosion has been generally accepted for many years, but the belief has also been held by many that coal dust is not in itself dangerous when unmixed with an explosive gas. Therefore, in past years little attention was given to dust in mines free from fire damp, and many disastrous explosions have resulted from lack of knowledge of the danger from coal dust. In the explosives gallery and experimental mine of the Bureau of Mines experiment station, Pittsburgh, Pa., it has been proved repeatedly and conclusively that coal dust will explode violently when no inflammable gas is present.

### PROPAGATION OF DUST EXPLOSIONS

A coal-dust explosion is an extremely rapid burning or combustion of the coal particles. Their burning consists essentially of the combination of the hydrocarbons in the coal with the oxygen of the air, a process that generates heat and flame and produces hot gases and water vapor. These gases and vapors have a volume many times that of the original coal particles; thus they exert an outward motion and pressure which constitute the explosive wave. When fine particles of coal are suspended in the air, each particle is surrounded by the oxygen of the air, and thus is well placed to oxidize or burn rapidly whenever the temperature is high enough. If some particles are ignited from any cause they will fire others, and the combustion will extend from particle to particle with extreme rapidity wherever enough coal dust of sufficient purity is present.

From the statement above one might assume that the coal dust lying on the mine floor or lodged along the walls is not dangerous while at rest. However, tests have shown that the air shock from

an explosion travels ahead of the flame and stirs up the dust, mixes it with the air, and thus enables the flame to extend the explosion. In this way, in a dusty mine, the explosive wave may travel through miles of entries and headings. Tests in the bureau's experimental mine have shown that 1 pound of 200-mesh coal dust in each 200 cubic feet of air is enough to propagate an explosion. The finer the dust the more dangerous it is, but any particles up to 20 mesh will help to spread an explosion.

### PREVENTION OF DUST EXPLOSIONS

The danger from coal-dust explosions may be minimized by the use of permissible explosives, by thorough ventilation, by the absence of open flames, by keeping down the quantity of dust, and by wetting the dust. The last method has been used with more or less efficiency in United States coal mines, and if properly carried out is effective, but many explosions in mines where watering was practiced have indicated that the method as applied practically is uncertain, and bureau engineers have lost confidence in it. Dr. R. V. Wheeler, director of research for the British Government, during a recent visit to the United States is said to have stated<sup>1</sup> that wetting coal dust is not a sure preventive because the thin film of dust on the surface of water, if raised into the air, is enough to cause an explosion. If the intervals between wettings are long the dust may dry out and again become dangerous. Wetting requires expensive piping and supervision, increases the rate of decay of mine timbers, and causes some roofs to soften and fall.

One of the most successful preventives of explosion is the "dusting" of coal mines with incombustible mineral powders. An explanation of this method is given on pages 3 to 4.

### ACKNOWLEDGMENTS

The writer desires to acknowledge many helpful suggestions from George S. Rice, chief mining engineer of the bureau. Acknowledgment is also due to the division of mineral resources of the United States Geological Survey for lists of limestone and gypsum operators. The maps that accompany this report were prepared by C. W. Cunningham, of the engineering department of Rutgers University.

### ROCK DUST AS AN EXPLOSION PREVENTIVE

Fine incombustible dusts, such as stone dust when mixed with coal dust, make ignition of the coal particles more difficult. If the inert dust is equal in amount to the coal dust, practically no danger exists of explosion from ordinary causes such as blown-out shots.

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<sup>1</sup>Explosives Engineer, vol. 2, March, 1924, p. 80.

British practice regards as safe the maintenance of an amount of inert dust equivalent to the amount of coal dust in the mine, but for the sake of safety the aim is to have 70 per cent of all the dust in the mine inert. Claim is made that there have been no explosions in British mines since this method has been used.

Tests<sup>2</sup> made some years ago at the Pittsburgh station of the Bureau of Mines indicated that in the Pittsburgh district a mine dust that contained 60 per cent of finely ground limestone would effectively halt the propagation of a dust explosion, even though a violent initial explosion had taken place. From later investigations<sup>3</sup> the conclusion was drawn that to blanket a violent explosion of pure fine coal dust thoroughly, the dust mixture should contain 75 per cent of the rock powder.

#### PREVENTIVE ACTION OF ROCK DUST IN THE AIR

When rock dust is mixed with coal dust in the air the inert dust grains absorb the heat of the flame; also as they are between the coal-dust particles they restrict the transfer of heat and flame from one particle of coal to another. The rock dust practically dilutes the mixture of coal dust and oxygen to a point where continued combustion becomes difficult or impossible.

#### APPLICATION OF ROCK DUST IN MINES

The rock dust should be scattered on the ribs and timbers of the passageways and in a thick layer on the floor. Additional dusting should be done whenever appreciable amounts of coal dust begin to show on the surface. Sometimes the passageways must be cleaned before redusting.

In France additional supplies of rock dust are usually placed on shelves of boards or canvas over the roadway. The shock of an explosion precipitates such material into the air and thus the flame is smothered. "Dust barriers" are placed at intervals in the workings, particularly in haulageways and at the entrances of ventilating splits. One form of barrier consists of 15 shelves each 20 inches wide placed across the entry 2 yards apart; fine rock dust is piled as high as possible on each shelf, the apex of the dust pile being close to the roof. The barriers should be so sensitive that a slow-moving explosive wave will not pass them without disturbing their loads. Various types of rock-dust barriers devised and tested by the Bureau of Mines have been described in detail.<sup>4</sup> It should be emphasized,

<sup>2</sup> Rice, George S., and Jones, L. M., *Methods of preventing and limiting explosions in coal mines*: Tech. Paper 84, Bureau of Mines, 1915, p. 17.

<sup>3</sup> Rice, George S., *What a miner can do to prevent explosions of gas and coal dust*: Miners' Circular 21, Bureau of Mines, 1916, p. 12.

<sup>4</sup> Rice, George S., and Jones, L. M., *Work cited*, pp. 21-42.

however, that dust barriers are merely secondary defenses and do not remove the need of dusting the walls or floors.

Dust may be distributed in a mine by means of a compressed-air blower or fan attached to a rock-dust car. Such equipment has the advantage of dislodging coal dust from projections or crevices and leaving rock dust in its place. In many of the British and French mines rock dust is distributed by hand.

#### AMOUNT OF ROCK DUST REQUIRED

It is estimated that the initial application of rock dust should be at least 5 pounds of dust per linear foot of entry, or about 13 tons per mile. From time to time as the proportion of coal dust on the walls and floor increases, the entry should be cleaned and new rock dust laid. Such redusting may be required monthly or possibly annually, as circumstances determine. If mining and haulage are conducted in such manner as to keep down the production of coal dust, the amount of rock dust required will be reduced. The amount of coal dust may be kept down by using tight coal cars, loaded so that the coal does not fall over the edge to be scattered and ground to dust along the roadway.

#### NECESSARY PROPERTIES OF DUSTING MATERIALS

Any incombustible powder may be used for dusting, but some materials are much more desirable than others. Chalk is used quite extensively in France. Roof shale is used in England, but coal-mine roof material in the United States is not generally suitable as it is often sandy or contains too high a percentage of inflammable material. Exhaustive studies<sup>5</sup> made by the Bureau of Mines indicate that siliceous dust would injure the health of miners. Some American roof shales may not be injurious. A study is now being made by the Bureau of Mines to determine the suitability of roof shales for dusting purposes.

Dark colored dusts are not desirable. They can not be distinguished from coal dust readily, and it is not easy to judge the amount of inert dust present, or how completely the coal dust may be blanketed by the inert powder. A white dust, on the other hand, contrasts with coal dust distinctly, and the proportion of inert material present is more readily estimated. White dust has the added advantage of improving the lighting of mines.

The dusting material must be obtainable at very low cost or the expense of dusting would be so great as to prohibit the use of the method.

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<sup>5</sup> Lanza, A. J., and Higgins, Edwin, Pulmonary disease among miners in the Joplin district, Missouri, and its relation to rock dust in the mines: Tech. Paper 105, Bureau of Mines, 1915, 48 pp.

Higgins, Edwin, and others, Siliceous dust in relation to pulmonary disease in the Joplin district, Mo.: Bull. 132, Bureau of Mines, 1917, 116 pp.

A dust that is desirable, therefore, is white, incombustible, non-siliceous, and inexpensive. In view of present high freight rates the desired material should be obtainable near the coal mine.

#### ADVANTAGES OF LIMESTONE, GYPSUM, AND ANHYDRITE

Materials that seem to promise fulfillment of the conditions named are limestone, gypsum, and anhydrite. Limestone is essentially carbonate of lime, and its dust is not considered injurious to the lungs of miners. It grinds to a white or light gray powder, is abundant, and usually may be procured at low cost. Gypsum is a hydrous calcium sulphate; it grinds to a white powder, is not injurious as a dust, and is fairly low-priced, though not as abundant or as generally distributed as limestone. Anhydrite is the anhydrous form of calcium sulphate and occurs in varying quantities in many gypsum mines. It is harder than gypsum, gives a white, noninjurious powder, and as it is largely a waste material it might be cheaper than gypsum in some localities.

#### GRAIN SIZE OF DUSTING MATERIALS

Aside from transportation charges, grinding is the greatest item of cost in a dusting material, increasing greatly as fineness increases. It is generally agreed, both in Europe and America, that to be effective the rock dust used must be fine enough to pass through a 20-mesh screen. Specifications adopted in Great Britain and approved by the Bureau of Mines require that 100 per cent shall pass through a 20-mesh screen and 50 per cent through a 200-mesh screen. To grind finer than these minimum requirements increases the production cost. Specifications are given in greater detail by the bureau.

#### COST OF DUSTING COAL MINES

According to a recent publication<sup>7</sup> of the bureau, the cost of dusting with pulverized roof shale in Europe, calculated according to present rates of exchange, ranges from one-half to 1½ cents per ton of coal produced. The cost in America would probably be somewhat more, as labor costs are higher and transportation charges would be added. Several companies quote prices between \$2 and \$3 per ton f. o. b. quarries for material ground in accordance with Bureau of Mines specifications. The maps in this report indicate that many limestone quarries and numerous gypsum mines are close to most of the important coal fields, consequently haulage charges would be low. In some places a low freight rate may be obtained

<sup>6</sup> Rice, George S., Paul, J. W., and Sayers, R. R., Tentative specifications for rock dusting to prevent coal-dust explosions in mines: Report of Investigations, Serial No. 2606, Bureau of Mines, May, 1924.

<sup>7</sup> Rice, George S., Stone dusting or rock dusting to prevent coal-dust explosions: Bull. 225, Bureau of Mines, 1924, 57 pp.

under a classification as agricultural limestone. Pulverized limestone, 25 per cent through a 100-mesh screen, is now being sold for agricultural purposes in Indiana as low as \$2.35 per ton delivered 60 miles from the pulverizing plant. Such material would have to be ground somewhat finer than this for dusting, which would increase the cost, but a price low enough to justify its use seems assured.

#### **ECONOMIC ADVANTAGES TO LIMESTONE AND GYPSUM PRODUCERS**

Limestone and gypsum producers should welcome coal-mine dusting as an outlet for their waste materials. Many limestone producers are handicapped by an accumulation of fine materials which are hard to sell. Gypsum producers likewise may accumulate supplies of gypsum off color or impure, or gypsum mixed with anhydrite which can not be marketed through the regular channels. For dusting material no careful selection according to rigid specifications is required and, therefore, waste materials could be sold at low cost. Thus the general application of rock dusting would not only tend to abate greatly the menace of dust explosions but would create a market for waste materials of the limestone and gypsum industries. As low cost is an essential requirement of rock dusting, this market might not be particularly profitable, but it would at least provide an outlet and a small return for material that must often bear the cost of handling with no return.

#### **LOW PRICES SHOULD BE MAINTAINED**

Wide use of coal-mine dusting will depend chiefly on the availability of low-priced dusting materials. Therefore, the maintenance of low prices and the refusal of limestone operators to increase prices unreasonably as the demand grows stronger will foster the market for their waste products and will encourage a humanitarian work.

#### **AVAILABILITY OF DUSTING MATERIALS**

As general use of limestone or gypsum in dusting coal mines depends largely on the cost, and the cost in turn depends chiefly on transportation, a survey has been made of sources of these materials close to coal mines, or on railway lines that would provide, at low freight rates, ready access to coal fields.

Gypsum industries and some branches of the limestone industries use much coal, and cheap transportation might be assured by shipping dusting material back to the mines in empty coal cars.

The following maps show sources of supply for each of the principal coal-mining States. Descriptive information is given, also lists of limestone and gypsum producers from whom inert powders might



be obtained. Quarries that are regarded as too remote from coal mines or too inaccessible to permit low-cost haulage are omitted.

The railway connections given in this report should not be regarded as reliable guides for shippers. They are for the most part the shortest routes shown on railway maps, but other considerations may make different routes more desirable. Any shipper can readily learn from railway offices the cheapest and most convenient route to any coal field. In outlining the routes reference is made to railways at the towns or cities nearest to the quarries. Some of these railways may not serve the quarries directly, but as the bureau lacks complete information on the exact location and shipping facilities of all quarries some errors are unavoidable.

#### ANALYSES OF QUARRY SAMPLES

The Bureau of Mines has no data regarding the chemical composition of the limestones from many of the quarries listed in this report, hence some of the quarries given on the maps as possible sources of supply may produce unsuitable dusting material. All operators who wish to supply dusting materials to coal mines should submit samples to the Pittsburgh station of the bureau for analysis. If analyses have already been made, copies may be submitted to the bureau for comment.

#### WESTERN PENNSYLVANIA

Many limestone quarries are near the coal fields of western Pennsylvania. The active limestone quarries form, in a general way, three groups. The first group includes those quarries within, or accessible from, the northern part of the bituminous coal area in Beaver, Lawrence, Mercer, Butler, Armstrong, Clarion, and Indiana Counties. The second group includes those quarries within or readily accessible from the southern coal area in Washington, Westmoreland, Fayette, Somerset, and Cambria Counties. The third important limestone area is east of the great coal-mining region except for the Broad Top field which lies within the area. The quarries are in Bedford, Blair, Huntingdon, Center, and Clinton Counties. For convenience these groups of limestone quarries are designated as occupying the northern, the southern, and the eastern districts.

Many limestone quarries lie farther east, but the series of parallel mountain ranges from northeast to southwest which characterize the Appalachian district makes transportation of rock into the coal regions from the eastern counties very difficult. In view of this difficulty, and because limestone is so plentiful close to the coal region, the limestone quarries lying east of Bedford and Huntingdon Counties are not shown on the map.

## NORTHERN DISTRICT

The most productive limestone area in the northern district is near New Castle, Lawrence County; from it an enormous tonnage of fluxing limestone is obtained. As only a small proportion of fines is permissible in fluxing stone, dusting material is available in this district in large quantities. Quarries at Bessemer, Hillsville, New Castle, Walford, Rose Point, and Mahoningtown are well served by railways, either to the Pittsburgh coal district or to the northern areas. The Pennsylvania R. R., the Baltimore & Ohio R. R., the Pittsburgh & Lake Erie R. R., and the Western Allegheny R. R. are the principal lines that serve this area. Quarries at Wampum, Lawrence County, near Elwood City, and at Beaver, Beaver County, are readily available to the Pittsburgh coal fields by the Pennsylvania R. R. or the Pittsburgh & Lake Erie R. R.

The Mercer and Butler coal fields might be supplied from quarries conveniently situated at Grove City, Mercer County, and at Annandale, Harrisville, Branchton, and Wick, Butler County. The quarries are all served by the Bessemer & Lake Erie R. R. as a primary carrier, though distribution in the Mercer field would be over the Pennsylvania line from Mercer. The Freeport field would be most easily served from West Winfield, Butler County, on the Pennsylvania R. R.

The nearest quarries to the Kittanning field of Armstrong County are at Kittanning and Templeton on the Pennsylvania R. R. and at East Worthington on the Buffalo, Rochester & Pittsburgh Ry. Coal mines in the low-grade division might be supplied from quarries at Kaylor in northwestern Armstrong County on the Western Allegheny R. R. and Oak Ridge in Clarion County on the Pennsylvania R. R. Oak Ridge might also supply the Clarion field by transshipment to the Lake Erie, Franklin & Clarion R. R. The Punxsutawney field might find a source of supply at Oak Ridge via the Pennsylvania R. R., or at Templeton or Kittanning via the Pittsburgh & Shawmut R. R. Limestone quarries at Marion Center on the Buffalo, Rochester & Pittsburgh Ry. in Indiana County might ship north to the Punxsutawney field or south to the Indiana field.

## SOUTHERN DISTRICT

Limestone quarries at West Alexander, Claysville, and Washington have direct communication with the Pittsburgh field by the Baltimore & Ohio R. R. The Klondike and southern Connellsville fields may be reached from Washington by the Pennsylvania R. R. Quarries in Westmoreland County, just over the county line from Belle Vernon on the Pittsburgh & Lake Erie R. R., are close to the mines of the southern Pittsburgh district. A quarry at Osbourne is

within the boundaries of the Latrobe coal field. Quarries at Uniontown and Connellsville, Fayette County, are well situated to serve the Connellsville district over a network of railway lines of the Pennsylvania R. R., Baltimore & Ohio R. R., and Monongahela R. R. Quarries at Mill Run and Normanville, on the Indian Creek Valley Ry., are well situated to supply the Indian Valley field and could readily serve the Connellsville field by transfer to the Baltimore & Ohio R. R. Quarries at Somerfield and Bidwell on the Baltimore & Ohio R. R., and at Confluence, on the Western Maryland Ry., might supply coal mines in their immediate neighborhood, and are also within easy reach of the Connellsville fields to the west or the Meyersdale and Somerset fields to the east. Quarries at Berlin in Somerset County on the Baltimore & Ohio R. R. are just on the edge of the eastern Meyersdale field. Bakersville, west of the Somerset field, is a possible source of supply but has no railway facilities. Quarries at Jenners and Jennerstown are near the Baltimore & Ohio R. R. in the northern Somerset coal district. Quarries at Johnstown, Cambria County, can easily serve the Johnstown field.

#### EASTERN DISTRICT

The eastern district, although not directly in the chief coal-mining areas, is adjacent thereto, and excellent railway facilities exist between the limestone quarries and the coal mines. There are many large and important quarries, particularly in Blair and Center Counties. The chief production is either for flux or lime, and for both of these purposes only a small proportion of the finer material is used. Much fine material is, therefore, available for dusting coal mines.

A quarry at Hyndman in southern Bedford County is directly connected with the Meyersdale coal field over the Baltimore & Ohio R. R. Quarries at Bedford, Manns Choice, Everett, Napier, and Ashcom in central Bedford County might possibly serve the Meyersdale field over the Pennsylvania R. R. and the Baltimore & Ohio R. R. via Hyndman, but the route is not direct or easy. This group of quarries is readily available to the Broad Top coal field via the Huntingdon & Broad Top Mountain R. R. and quarries at Antriken, north of the coal field in Huntingdon County, are on the same railway. Quarries at Orbisconia, in Huntingdon County, are also sources of supply for this coal field by the East Broad Top R. R. Mapleton Depot quarries might also serve by an indirect route but their situation is probably too inconvenient. Quarries at Union Furnace, Tyrone Forge, Tyrone, and Aktoona, on the main line of the Pennsylvania R. R., are easily accessible to many parts of the coal area. Quarries in southern Blair County at Hollidaysburg, Martinsburg, Duncanville, Blairfour, Frankstown, Canoe Creek, and

Williamsburg are also easily accessible by the main line of the Pennsylvania R. R. The limestone quarries of Center County, although adjacent to the northern part of the Clearfield coal district, are not available to it on account of intervening mountains. Many quarries in the Bellefonte district, also those at Spring Mills, Center Hall, Coburn, Oak Hall, and Pleasant Gap, are on or near the Pennsylvania R. R., but because of the longer haul via the main line these quarries can not supply the coal fields as readily as the Blair County quarries. Quarries near Salone, in Clinton County, might supply material for the northern Clearfield coal district by way of the New York Central R. R.

## LOCATION OF COMPANIES

A list of the companies, at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate I. When the office and quarry are not at the same place the office address is given after the company name. The companies are given by counties, the latter being arranged alphabetically.

*Limestone operators in western Pennsylvania*

Company	Map reference No., Plate I	Quarry at—
<b>Armstrong County:</b>		
Pittsburgh Limestone Co., Washington Street, New Castle, Pa.	17	Kaylor.
Kittanning Limestone Co.....	18	East Worthington.
Templeton Limestone Co.....	19	Kittanning.
	20	Templeton.
<b>Beaver County:</b>		
Clydesdale Brick & Stone Co., 3045 Jenkins Arcade Building, Pittsburgh, Pa.	9	Ellwood City (near).
Richard Wilson.....	10	Beaver.
<b>Bedford County:</b>		
Pennsylvania State Highway Commission, Harrisburg, Pa.	40	Napier.
	41	Manns Choice.
	42	Bedford.
	44	Everett Rock.
Joseph E. Thropp, Everett, Pa.....	43	Ashcom.
Enterprise Lime & Ballast Co.....	39	Hyndman.
A. M. McClure Lime Bluff Co.....	49	Everett.
<b>Blair County:</b>		
W. H. Delancey.....	55	Altoona.
Blair Limestone Co., Third Avenue and Ross Street, Pittsburgh, Pa.	53	Blairfour.
Duncansville Lime & Stone Co.....	50	Duncansville.
American Lime & Stone Co., Bellefonte, Pa..	51	Frankstown.
Canoe Creek Stone Co.....	54	Canoe Creek.
Blair County Home.....	49	Hollidaysburg.
Calcium Products Co.....	49	Do.

*Limestone operators in western Pennsylvania—Continued*

Company	Map reference No., Plate I	Quarry at—
<b>Blair County—Continued.</b>		
C. F. Baughman-----	48	Martinsburg.
Tyrone Lime & Stone Co.-----	58	Tyrone.
American Steel & Wire Co. of New Jersey, 502 Western Reserve Building, Cleveland, Ohio.	52	Williamsburg.
The McKinney Steel Co., Cleveland, Ohio---	52	Do.
Pittsburgh Limestone Co., Carnegie Build- ing, Pittsburgh, Pa.	57	Tyrone.
<b>Butler County:</b>		
Pittsburgh Limestone Co., Carnegie Build- ing, Pittsburgh, Pa.	13	Annandale.
T. K. Morris Lime & Limestone Co., 2215 Oliver Building, Pittsburgh, Pa.	12	Harrisville.
Winfield Limestone Co., 2215 Oliver Build- ing, Pittsburgh, Pa.	16	West Winfield.
Grove City Limestone Co., Grove City, Pa.	16	Do.
Climax Lime & Stone Co.-----	16	Do.
<b>Cambria County:</b>		
Conemaugh Valley Lime & Coal Co., Inc., 405 Swank Building, Johnstown, Pa.	15	Branchton.
<b>Center County:</b>		
Oak Hall Lime & Stone Co., Bellefonte, Pa.	14	Wick.
Valley View Lime Co.-----	37	Conemaugh.
White Rock Quarries, Bellefonte, Pa.-----	60	Oak Hall Station.
American Lime & Stone Co., Bellefonte, Pa.	63	Bellefonte.
Center County Lime Co.-----	62	Pleasant Gap.
Chemical Lime Co.-----	65	Spring Mills.
Center Hall Lime & Stone Co.-----	63	Bellefonte.
Milheim Turnpike Co., Milheim, Pa.-----	64	Do.
<b>Clarion County:</b>		
Clarion Land & Improvement Co., New Bethlehem, Pa.	64	Do.
<b>Clinton County:</b>		
Bellefonte Lime Co., Bellefonte, Pa.-----	61	Center Hall.
<b>Fayette County:</b>		
Standard Lime & Stone Co., 524 Equitable Building, Baltimore, Md.	66	Coburn.
A. W. Sipe-----	21	Oakridge.
Jas. D. Mountain, Mill Run, Pa.-----	67	Salona.
J. J. Mountain-----	32	Bidwell.
Pennsylvania State Highway Commission, Harrisburg, Pa.	31	Mill Run.
Casparis Stone Co., Clinton Building, Colum- bus, Ohio.	30	Normanville.
<b>Huntingdon County:</b>		
S. I. Taylor-----	31	Mill Run.
Mifflin Limestone Co., Huntingdon, Pa.-----	27	Uniontown.
Enoch I. Grove-----	28	Connellsville.
Pennsylvania State Highway Commission, Harrisburg, Pa.	47	Entriken.
American Lime & Stone Co., Bellefonte, Pa.	46	Mapleton Depot.
<b>Indiana County:</b>		
H. S. Wynkoop-----	45	Orbisonia.
<b>Lawrence County:</b>		
Bessemer Limestone Co., Youngstown, Ohio.	59	Franklinville.
Carbon Limestone Co., 814 Stambaugh Building, Youngstown, Ohio.	56	Union Furnace.
	22	Marion Center.
	4	Bessemer.
	1	Hillsville.

*Limestone operators in western Pennsylvania—Continued*

Company	Map reference No., Plate I	Quarry at—
<b>Lawrence County—Continued.</b>		
Geo. W. Johnson Limestone Co., Carnegie Building, Pittsburgh, Pa.	1	Hillsville.
Rose Point Stone & Lime Co., New Castle, Pa.	7	Rose Point.
Lake Erie Limestone Co., 901 Wick Building, Youngstown, Ohio.	5	Hillsville.
Union Limestone Co., 901 Wick Building, Youngstown, Ohio.	5	Do.
Duck Run Lime Co.-----	2	New Castle.
Mahoning Limestone Co.-----	3	Do.
Shenango Limestone Co., Leetonia, Ohio-----	3	Do.
Pittsburgh Crucible Steel Co., Grand Central Station, New York, N. Y.	4	Walford.
Lawrence Limestone Co., Carnegie Building, Pittsburgh, Pa.	6	Mahoningtown.
	8	Wampum.
<b>Mercer County:</b>		
Grove City Limestone Co.-----	11	Grove City.
<b>Somerset County:</b>		
Geo. P. Brubaker-----	38	Berlin.
Jno. A. Liston, Bidwell-----	33	Confluence.
A. E. Fritz, R. F. D. No. 1, Friedens, Pa.-----	36	Jenners.
Pennsylvania State Highway Commission, Harrisburg, Pa.	34	Somerfield.
	35	Bakersville.
	36	Jennertown.
<b>Washington County:</b>		
Carson Blayney-----	24	Claysville.
B. B. Wilson-----	25	Washington.
Alexander Taylor-----	23	West Alexander.
Wm. Hutchinson-----	23	Do.
P. V. Paul-----	25	Washington.
<b>Westmoreland County:</b>		
Clarence M. Finley-----	26	Belle Vernon (near).
Rostraver Township Supervisor-----	26	Do.
Grove City Limestone Co., Grove City, Pa.-----	29	Osborne.

**WEST VIRGINIA AND WESTERN MARYLAND**

Limestone quarries that might supply dusting materials are at a number of localities close to the West Virginia and western Maryland coal mines. A quarry at Bramwell, Mercer County, is on the edge of the Pocahontas field. The southwestern fields could also be supplied from quarries in near-by Virginia and Kentucky, as indicated on the maps in Plates III and IV. Several large quarries in Mineral County, at Ackerman, Keyser, Ridgeley, and Laurel Dale, and at Pinto and Corriganville in Allegany County, Md., are close to the Cumberland and Piedmont fields. A quarry at Webster in Taylor County lies within the eastern part of the Fairmount fields, while one at Greer, Monongalia County, is just between the eastern and western sections of the Fairmount field near its northeastern end. Several quarries near Terra Alta, Preston County, are a few miles distant

from the Fairmont field, and are close to the Baltimore & Ohio R. R. A quarry at Bowden, Randolph County, on the Western Maryland Ry., is within easy reach of the Junior coal field. Several quarries at Wheeling, Ohio County, are directly in the Panhandle Field.

Other limestone quarries, more distant from the mines but easily accessible, are at Fort Springs and Renick, Greenbrier County, and at Marlinton, Pocahontas County; all of these are on the main line of the Chesapeake & Ohio Ry., which passes directly through the coal fields of southwestern West Virginia. A large quarry near Kenova just over the line in Boyd County, Ohio, is also on the Chesapeake & Ohio Ry. west of the coal fields. The most extensive limestone industry in West Virginia is in Jefferson and Berkeley Counties at Bakerton, Millville, Engle, Kearneysville, Martinsburg, Bunker Hill, Falling Waters, and Berkeley. These quarries, several of which have large accumulations of waste limestone for which no market can be found, are located either close beside, or easily accessible to the main line of the Baltimore & Ohio R. R., which passes through the Cumberland and Fairmont fields.

Quarries in Maryland at Cavetown, Hagerstown, Hancock, and Williamsport, on the Western Maryland Ry., are accessible to the Cumberland Piedmont field. Other sources of supply are in northern Virginia. Material could be shipped from some quarries by the Baltimore & Ohio R. R. via Harpers Ferry or by the Norfolk & Western Ry. and Baltimore & Ohio R. R. via Shenandoah Junction, but the transportation cost would probably be too high to justify such movement.

Both gypsum and anhydrite are available in large quantities near Saltville and Plasterco in Smyth and Washington Counties, Va. See locations 19 and 20 on Plate III.) Such material could be shipped by the Norfolk & Western Ry. via East Radford to the Pocahontas, Lug River, Thacker, and Kenova fields of southwestern West Virginia.

#### LOCATION OF COMPANIES

A list of the limestone companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, is given below. The numbers refer to the locations of the quarries, as shown in Plate II. When the office and quarry are in different locations the office address is given after the company name. The companies are given by States and by counties, which are alphabetically arranged.

*Limestone operators in West Virginia*

Company	Map reference No., Plate II	Quarry at —
Berkeley County:		
F. A. Jones Stone & Lime Co., Martinsburg, W. Va.	2	Falling Waters.
Pittsburgh Limestone Co., Carnegie Building, Pittsburgh, Pa.	2	Do.
Berkeley County Road Engineer	1	Martinsburg.
Blair Limestone Co., Third Avenue and Ross Street, Pittsburgh, Pa.	1	Do.
J. E. Baker Co., York, Pa.	1A	Bunker Hill.
Kelley Island Lime & Transport Co., 1125 Leader-News Building, Cleveland, Ohio.	1	Martinsburg.
Security Cement & Lime Co., Hagerstown, Md.	2	Berkeley.
Standard Lime & Stone Co., Baltimore, Md.	1	Martinsburg.
Greenbrier County:		
Acme Limestone Co., Alderson, W. Va.	3	Fort Spring.
H. Frazier, First National Bank Building, Richmond, Va.	3	Do.
Renick Stone Co.	4	Renick.
Jefferson County:		
Washington Building Lime Co., Buckeystown, Md.	5	Bakerton.
Keystone Limestone Co., Carnegie Building, Pittsburgh, Pa.	6	Millville.
Potomac Lime & Stone Co., Frederick, Md.	7	Engle.
Blair Limestone Co., Third Avenue and Ross Street, Pittsburgh, Pa.	6	Millville.
Standard Lime & Stone Co., Baltimore, Md.	6	Millville.
Millville Stone & Lime Co., Farmers Bank Building, Pittsburgh, Pa.	8	Kearneysville.
	6	Millville.
Mercer County:		
E. K. Newell & Co., Maybury, W. Va.	9	Bramwell.
Mineral County:		
Cumberland Cement & Supply Co., Cumberland, Md.	10	Ackerman.
Mineral County Farm Bureau	11	Keyser.
County Commissioner of Mineral County	10	Ridgeley.
Geo. L. Brown	12	Laurel Dale.
Monongalia County:		
Greer Limestone Co.	13	Greer.
Ohio County:		
County Road Engineer	14	Wheeling.
Pocahontas County		
Pocahontas County Quarries, County Court, Marlinton, W. Va.	15	Marlinton.
Preston County:		
Wm. J. Groves, Terra Alta, W. Va.	16	Pleasant Hill.
Randolph County:		
Bennett & Hester, Belington, W. Va.	17	Bowden.
Taylor County:		
J. Henry Roach, R. F. D. 8, Grafton, W. Va.	18	Webster.
Boyd County (Kentucky):		
Basic Products Co., 2514 Oliver Building, Pittsburgh, Pa.	19	Kenova, W. Va. (near).



*Limestone operators in western Maryland*

Company	Map reference No., Plate II	Quarry at—
Allegany County:		
Cumberland Cement & Supply Co., Cumberland, Md.	10A	Corriganville.
H. S. Rawlings.....	10B	Pinto.
Washington County:		
G. M. Bushey & Son, Inc.....	20	Cavetown.
H. E. Bester.....	21	Hagerstown.
Security Cement & Lime Co., Hagerstown, Md.	21	Security.
I. G. Robinson.....	22	Hancock (near).
Keystone Limestone Co., Carnegie Building, Pittsburgh, Pa.	23	Williamsport.

**VIRGINIA**

Several limestone quarries are situated within easy reach of the Southwest coal fields of Virginia. Quarries near Big Stone Gap and St. Paul, Wise County, are just on the edge of the coal field that covers the northern part of the county. Quarries at Duffield, Scott County, on the Southern Ry., and at Dryden and Wheeler in Lee County on the Louisville & Nashville R. R., are short distances from the coal mines. Quarries at Pounding Mill and Tazewell are easily accessible by the Norfolk & Western Ry. to the coal region of northwestern Tazewell County. A quarry at Bramwell in Mercer County, W. Va., is on the edge of the Pocahontas field, which is partly in Virginia though chiefly in West Virginia.

The limestone quarries most easily accessible to the coal region of Montgomery and Pulaski Counties are at Pembroke, Ripplemead, and Kerns, in Giles County, a few miles north and directly connected by the Virginian Ry. and the Norfolk & Western Ry. Quarries at Marion in Smyth County; Wytheville and Ivanhoe, in Wythe County; Buchanan, Indian Rock, and Blue Ridge, in Botetourt County; and Glasgow in Rockbridge County, all on the Norfolk & Western Ry., are within easy reach. Several quarries are situated near Roanoke, on either the Virginian Ry. or the Norfolk & Western Ry. Quarries at Craigs ville, on the Chesapeake & Ohio Ry., and at Staunton, on the Chesapeake & Ohio Ry. and the Baltimore & Ohio R. R., in Augusta County, are possible sources but less accessible. Quarries well situated but probably inactive and therefore not mapped, are reported at Blacksburg and Radford.

Quarries at Lowmoor in Alleghany County and at Eagle Rock in Botetourt County, on the Chesapeake & Ohio Ry., are more directly available to the West Virginia than to the Virginia coal mines.

Quarries near Strasburg Junction, in Shenandoah County, and at Stevens City in Frederick County on the Baltimore & Ohio R. R., also at Riverton, in Warren County on the Southern Ry. and Norfolk & Western Ry., are possible sources of supply for the northeastern coal fields of West Virginia, but are probably too far away for profitable use.

The gypsum mines near Saltville in Smyth County and Plasterco in Washington County could supply large quantities both of gypsum and anhydrite. Because of the parallel mountain ranges lying between these mines and the coal fields, transportation is not easy or direct.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate III. When the office and quarry are in different locations the office address is given after the company name. The companies are given by counties, the latter being arranged alphabetically.

#### *Limestone operators in Virginia*

Company	Map reference No., Plate III	Quarry at—
<b>Alleghany County:</b>		
Lowmoor Iron Co. of Virginia.....	6	Lowmoor.
<b>Augusta County:</b>		
Princess Iron Corp., Glen Wilton, Va.....	5	Craigsville.
Virginia State Convict Lime-Grinding Board.....	4	Staunton.
Belmont Trap Rock Co., Inc., Herndon, Va.....	4	Do.
William Larner & Co.....	4	Do.
General Manager, City of Staunton.....	4	Do.
Staunton Lime Products Co.....	4	Do.
<b>Botetourt County:</b>		
Blue Ridge Stone Co., Box 1010, Roanoke, Va.....	10	Blue Ridge.
Eagle Rock Lime Co.....	7	Eagle Rock.
Moore Lime Co.....	7	Do.
Virginia Iron, Coal & Coke Co., Roanoke, Va.....	9	Buchanan.
E. Dillon's Sons, Inc.....	9	Indian Rock.
<b>Frederick County:</b>		
M. J. Grove Lime Co., Limekiln, Md.....	1	Stevens City.
<b>Giles County:</b>		
Pembroke Limestone Works, care of W. W. Boxley & Co., Roanoke, Va.....	13	Pembroke.
Virginia Limestone Corp.....	13	Ripplemead.
Kimbalton Lime Co., Shawsville, Va.....	12	Kerns.

*Limestone operators in Virginia—Continued*

Company	Map reference No., Plate II	Quarry at—
<b>Lee County:</b>		
Price Stone & Lime Co., Gibson Station, Va.	25	Wheeler.
Chairman Board of Supervisors, Lee County, Jonesville, Va.	23	Dryden.
<b>Roanoke County:</b>		
M. Grosso & Son	11	Roanoke.
B. W. & H. G. Mundy	11	Do.
Robt. Churchill	11	Do.
A. J. Huff & Sons	11	Do.
<b>Rockbridge County:</b>		
Lone Jack Limestone Co., Inc., People's National Bank Building, Lynchburg, Va.	8	Glasgow.
<b>Scott County:</b>		
Simpson & Crawford	24	Duffield.
<b>Shenandoah County:</b>		
Powhatan Lime Co.	2	Strasburg Junction.
Washington Building Lime Co., Buckeystown, Md.	2	Strasburg.
Strasburg Lime Co.	2	Do.
Rockdale Lime Co.	2	Toms Brook.
Shenandoah Lime Co.	2	Strasburg Junction.
<b>Smyth County:</b>		
Mathieson Alkali Works, Saltville, Va.	16	Marion.
<b>Tazewell County:</b>		
Kinser & Vermillion, Tazewell, Va.	17	North Tazewell.
Pounding Mill Quarry, Box 1010, Roanoke, Va.	18	Pounding Mill.
<b>Warren County:</b>		
Riverton Lime Co.	3	Riverton.
<b>Wise County:</b>		
Holston Corporation, Johnson City, Tenn.	21	St. Paul (near).
Stonega Coal & Coke Co.	22	Big Stone Gap.
Wise Construction Co.	22	Do.
<b>Wythe County:</b>		
Bertha Mineral Co., Austinville, Va.	15	Ivanhoe.
National Carbide Co.	15	Do.
Pulaski Iron Co., Pulaski, Va.	15	Do.
R. C. Crigger	14	R. F. D. No. 4, Wytheville.
Chairman Street Committee, Wytheville Town Quarry.	14	Wytheville.

*Gypsum operators in Virginia*

Company	Map reference No., Plate III	Mine at—
<b>Smyth County:</b>		
Southern Gypsum Co., Inc.	19	North Holston, Va.
<b>Washington County:</b>		
United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.	20	Plasterco.

**KENTUCKY**

Few limestone quarries in Kentucky are close to the coal mines, but many are within reasonable distance of both the eastern and the western coal regions.

In the eastern Kentucky field a quarry at Pineville, Bell County, is situated within the southern Appalachian coal field. In Rockcastle County quarries at Burr, Mt. Vernon, Pine Hill, and Withers are close to the coal area near the center of that county, are a short distance from the coal mines of Laurel County, and have direct connection over the Louisville & Nashville R. R. with the Jellico field. A quarry at Yellow Rock in Lee County is quite convenient to the coal mines of Beattyville and Banford of that county and is directly connected by the Louisville & Nashville R. R. with the mines at Jackson and in the Hazard field. A quarry in Boyd County, just over the line from Kenova in West Virginia, is excellently situated on the Chesapeake & Ohio Ry. to serve the coal mines of Boyd and Carter Counties.

The other quarries available to the eastern district are more remote. Quarries at Somerset in Pulaski County and near Eubank in Lincoln County are within easy reach of the Cincinnati Southern coal fields over the Southern Ry. Quarries at High Bridge and Nicholasville in Jessamine and at Harrodsburg in Mercer County, are on the same railway line but at a greater distance. A quarry at Stanford, Lincoln County, could serve the coal mines of Rockcastle and Laurel Counties or beyond to the Jellico field. The same quarry could serve the Cincinnati Southern field over the Louisville & Nashville R. R. and the Southern Ry. via Junction City. Quarries at Winchester, Clark County, have direct connection over the Louisville & Nashville R. R. with the coal mines of Lee and Breathitt Counties and to the Hazard field, Perry County.

A quarry at Lawton, Carter County, is admirably situated on the Chesapeake & Ohio Ry. to supply material to the coal mines of Carter and Boyd Counties. A quarry at Carter, in northern Carter County, is about the same distance from the same coal mines as Lawton, but transportation is very indirect northward to the Ohio River and then east and south to Ashland.

Limestone quarries at Big Stone Gap, Dryden, and Whalen in Virginia are close to the Southern Appalachian, Harlan, Benham, and Elkhorn coal fields, but the Cumberland Mountains present a difficult barrier to interstate transportation. One route, however, is open south over the Louisville & Nashville R. R. and through Cumberland Gap to the southern Appalachian field.

A semicircle of limestone quarries lies beyond the borders of the western Kentucky coal field, but most of them are conveniently situated for transportation to the coal mines. A quarry at Smithland

in Livingston County has no railway service, but water transportation on the Ohio River is possible. A quarry at Princeton, Caldwell County, could ship material directly to the coal mines of Hopkins and Muhlenberg Counties over the Illinois Central R. R., and a quarry at Cerulean, Trigg County, has similar facilities by way of Princeton. Quarries at Hopkinsville, Christian County, have direct north connection with coal mines of Hopkins County, and quarries at Russellville, Logan County, are similarly situated with railroad facilities to the Muhlenberg County coal mines. A quarry at Elkton, Todd County, is less conveniently located, as transportation would be south to Guthrie, and from there either northwest or northeast via Hopkinsville or Russellville. From quarries at Bowling Green in Warren County transportation would be over the Louisville & Nashville R. R. via Russellville. Direct service over the Illinois Central R. R. is supplied for a quarry at Stephensburg in Hardin County, connecting it with the mines of Muhlenberg and Hopkins Counties. Quarries at Irvington and Webster in northern Breckinridge County might supply the northern mines of the coal field along the Ohio River via the Louisville, Henderson & St. Louis Ry.

Several limestone quarries near Louisville in Jefferson County, although possibly too remote for profitable use, have direct railway connection over either the Illinois Central R. R. or the Louisville, Henderson & St. Louis Ry. A quarry across the Ohio River at Evansville, Vanderburg County, Ind., might be a source of supply for the northern part of the western Kentucky coal field. There are many limestone quarries that are more distant from the coal fields than those indicated on the map, but as the high cost of transportation would discourage shipment, they have been omitted.

#### LOCATION OF COMPANIES

A list of the companies at the locations cited, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate IV. When the office and quarry are in different locations, the office address is given after the company name. The companies are given by counties, which are alphabetically arranged.

*Limestone operators in Kentucky, eastern district <sup>a</sup>*

Company	Map reference No., Plate IV	Quarry at—
Bell County:		
Pineville Stone & Quarry Co.....	12	Pineville.
Pulaski County:		
Connelly Construction Co.....	13	Somerset.
Rockcastle County:		
W. J. Sparks & Co., Mount Vernon, Ky.....	15	Burr, Mt. Vernon.
Rockcastle Cement & Lime Co., Mount Vernon, Ky.	16	Withers.
Rockcastle Cement & Lime Co., Mount Vernon, Ky.	16	Pine Hill.
Lincoln County:		
County Engineer, Lincoln County, Stanford, Ky.	17	Stanford.
County Engineer, Lincoln County, Stanford, Ky.	14	Eubank (near).
Lee County:		
Boggs, Burnam & Co., Heidelberg, Ky.....	22	Yellow Rock.
Mercer County:		
J. Harvey Vandiver.....	18	Harrodsburg.
Jessamine County:		
Thompson-Weinman & Co., 101 Park Avenue, New York City.	20	Nicholasville.
The American Stone Ballast Co., 711 Fourth National Bank Bldg., Cincinnati, Ohio.	19	High Bridge.
Clark County:		
Clark County Construction Co.....	21	Winchester.
Carter County:		
The Poplar Ballast Co., Carter, Ky.....	24	Poplar Station.
Olive Hill Limestone Co.....	23	Olive Hill.
Tygart Limestone Co.....	23	Lawton.
Boyd County:		
Basic Products Co., 2514 Oliver Building, Pittsburgh, Pa.	25	Kenova, W. Va. (near).

<sup>a</sup> The quarry companies of the eastern district are given in order by counties, beginning in the southern part and working north.

*Limestone operators in Kentucky, western district <sup>a</sup>*

Company	Map reference No., Plate IV	Quarry at—
Livingston County:		
Oscar Barrett, 405 Saint Paul Building, Cincinnati, Ohio.	1	Smithland.
Caldwell County:		
T. W. Katterjohn Construction Co., R. F. D. No. 3, Princeton, Ky.	2	Princeton.
Trigg County:		
Cerulean Stone Co., Cerulean, Ky.....	3	Cerulean Springs.
Christian County:		
Cook Stone Co.....	4	Hopkinsville.
Hopkinsville City Quarry.....	4	Do.
Todd County:		
F. C. Gorrell & Sons, Russellville, Ky.....	5	Elkton.
Logan County:		
W. J. Sparks, Mount Vernon, Ky.....	6	Russellville.
F. C. Gorrell & Sons.....	6	Do.

<sup>a</sup> The quarry companies in the western Kentucky coal district are given in order by counties from west to east.

*Limestone operators in Kentucky, western district—Continued*

Company	Map reference No., Plate IV	Quarry at—
Warren County:		
Bowling Green Quarries Co.-----	7	Bowling Green.
F. C. Gorrell & Sons, Russellville, Ky.-----	7	Do.
Hardin County:		
The Lilmay Stone Co., Shively, Ky.-----	8	Stephensburg.
Breckinridge County:		
S. W. Davis, Mystic, Ky.-----	9	Irvington.
Webster Stone Co., Irvington, Ky.-----	10	Webster (Dugan).
Jefferson County:		
Louisville & Nashville Ry. Co., Louisville, Ky.	13	Avoca.
Kosmos Portland Cement Co.-----	12	Kosmosdale.
County Engineer, Jefferson County-----	11	Louisville.
R. B. Tyler Stone Co., 114 South Fourth Street, Louisville, Ky.	13	Tucker Station.
Superintendent, Louisville City Workhouse, 1388 Payne Street, Louisville, Ky.	11	Louisville.

**TENNESSEE**

A few limestone quarries occur within the coal district of Tennessee. Those outside the coal district are chiefly in the Knoxville and Chattanooga districts, both of which are fortunately available for use over fairly direct railway lines. One of the most favorably situated quarries is at La Follette in Campbell County, available to the southern Appalachian and Jellico coal fields over the Louisville & Nashville R. R. Both the Louisville & Nashville R. R. and the Southern Ry. lead south from this quarry to the La Follette field. Equally well situated is a limestone quarry at Harriman, Roane County, for the Louisville & Nashville R. R. leads north to the coal fields of Roane, Morgan, and Anderson Counties, and the Southern Ry. and the Tennessee Central Ry. lead southwest to the Rockwood coal fields. A lime-plant quarry at Crab Orchard, Cumberland County, is a short distance west of the Rockwood coal district on the Tennessee Central Ry.

In the southern part of the coal field a large lime-plant quarry at Sherwood, Franklin County, might supply the coal mines near South Pittsburgh and Whiteside over the Nashville, Chattanooga & St. Louis Ry. Material might also be shipped north over the same railroad via Corvan to the coal mines of Grundy County.

Nearly all of the limestone quarries west of the coal fields are too far distant or too indirectly served by railways to be used profitably as sources of dusting materials. A quarry at Summitville on the Nashville, Chattanooga & St. Louis Ry. in Coffee County is a possible source, via Tullahoma and Corvan, for the Grundy County coal mines.

A quarry at Sparta in White County on the Nashville, Chattanooga & St. Louis Ry. is well located to serve the coal mines of White and western Cumberland Counties.

Limestone quarries in the Chattanooga district at East Chattanooga, Shepard, and Lookout are convenient sources of supply for coal mines at Whiteside and South Pittsburgh and possibly north to the mines of northern Marion, Sequatchie, and Bledsoe Counties, all on the Nashville, Chattanooga & St. Louis Ry. North from Chattanooga the Southern Ry. provides a direct route to the Soddy coal field of Hamilton County and the coal mines of southern Rhea County.

In Knox County, limestone quarries are situated at Mascot and near Knoxville. A great many marble quarries occupy the Knoxville district and their waste products might afford a supply of dusting material. The products could be conveyed to the coal fields of Anderson and Morgan Counties, and north to the La Follette, southern Appalachian, and Jellico coal fields by either the Louisville & Nashville R. R. or the Southern Ry. A few limestone quarries exist in the northeastern counties of Tennessee, but the transportation expense would be heavy and on this account they are not included in the map or lists.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned which reported to the U. S. Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate V. Where the office and quarry are in different locations, the office address is given after the company name. The quarry companies are given by counties, which are arranged alphabetically.

#### *Limestone operators in eastern Tennessee*

Company	Map reference No., Plate V	Quarry at—
Campbell County:		
La Follette Coal & Iron Co.-----	1	La Follette.
Coffee County:		
Tennessee Cement & Lime Co., 306½ Union Street, Nashville, Tenn.	11	Summitville.
Cumberland County:		
Southern States Lime Corporation, Charleston, S. C.	9	Crab Orchard.
Franklin County:		
Gager Lime & Manufacturing Co., 921 James Building, Chattanooga, Tenn.	12	Sherwood.



*Limestone operators in eastern Tennessee—Continued*

Company	Map reference No., Plate V	Quarry at—
<b>Hamilton County:</b>		
J. H. Bragg, Dodson Avenue, East Chattanooga, Tenn.	14	East Chattanooga.
Chickamauga Quarry & Construction Co., 223 First National Bank Building, Chattanooga, Tenn.	15	Chickamauga.
Holston Quarry Co., Strawberry Plains, Tenn.	13	Lookout.
<b>Knox County:</b>		
Williams Lime Manufacturing Co., Box 559, Knoxville, Tenn.	5	Knoxville.
Holston Quarry Co., Strawberry Plains, Tenn.	4	Do.
Crystal Gray Marble Co.-----	4	Do.
Knoxville Sand & Lime Co., Box 1046, Knoxville, Tenn.	4	Do.
J. P. McClusky, 3105 East Fifth Avenue, Knoxville, Tenn.	4	Do.
Oliver King Sand & Lime Co., Box 606, Knoxville, Tenn.	4	Do.
Tennessee Lime & Sand Co.-----	4	Do.
Tennessee Quarry Co., 608 Burwell Building, Knoxville, Tenn.	5	Do.
American Zinc Co., of Tennessee-----	3	Mascot.
Victoria Marble Co.-----	5	Knoxville.
Appalachian Marble Co.-----	5	Knoxville (near).
Cedar Bluff Marble Co., Knoxville, Tenn.---	6	Ebenezer (near).
Evans Marble Co.-----	5	Knoxville (near).
Ross & Republic Marble Co.-----	5	Do.
Tennessee Producers Marble Co., Knoxville, Tenn.	8	Concord.
<b>Roane County:</b>		
Harriman Cement & Stone Co.-----	8	Harriman.
<b>Union County:</b>		
Tennessee Marble Lime Co., 709 Market Street, Knoxville, Tenn.	2	Luttrell.
Ross & Republic Marble Co., Knoxville, Tenn.	2	Do.
<b>White County:</b>		
Thompson, Weinman & Co., 101 Park Avenue, New York City.	10	Sparta.

**NORTHERN ALABAMA AND NORTHWESTERN GEORGIA**

The small coal-mining areas of northeastern Alabama and northwestern Georgia might obtain pulverized limestone supplies from quarries in the Chattanooga district, as shown on Plate V. A quarry at Hooker, Dade County, Ga., on the Nashville, Chattanooga & St. Louis Ry. close to the Tennessee border might also be utilized.

For the important coal-mining districts near Birmingham many limestone quarries are within easy reach. A lime-plant quarry at Allgood, Blount County, is within the southern part of the Blount Mountain coal field. Other parts of this coal district may be served by either the Louisville & Nashville R. R. or the Nashville, Chattanooga & St. Louis Ry. from quarries near Cobb and at Gadsden, La

Garde, and Rock Springs in Etowah County. Material from a quarry at Tredegar, Calhoun County, on the Seaboard Air Line Ry., would follow a similar route. A quarry at Portland, Polk County, Ga., also on the Seaboard Air Line Ry., is a possible source of supply. The quarries at Tredegar and Portland would, however, be more convenient to the Coosa coal field as the Seaboard Air Line Ry. leads directly to these mines. The quarries of Etowah County could also ship south via Wellington to the Coosa field.

Important lime-manufacturing industries located in Shelby County at Calera, Eureka, Roberta, Keystone, Wilmay, Saginaw, and Newala are admirably located to serve the Cahaba coal fields via the Louisville & Nashville R. R. A quarry at Woodstock on the Southern Ry. in Bibb County is close to the southern part of the Cahaba coal mines, and could also supply the southwestern part of the Warrior River coal field via the Louisville & Nashville R. R. A large marble quarry at Gantts Quarry near Sylacauga, Talladega County, could supply large quantities of very pure pulverized marble from its waste products. The Louisville & Nashville R. R. affords a direct route to the coal mines of the Cahaba field.

Several large and important limestone quarries at Dolcote, Gate City, Ketona, Vanns, and North Birmingham, Jefferson County, are available to the Warrior River, Cahaba, and Coosa coal fields.

A quarry at New Decatur, Morgan County, has direct connection via the Louisville & Nashville R. R. with the Warrior River field. An important limestone industry at Rockwood near Russellville, Franklin County, is the most available source of supply for the western Warrior River field, with direct connection via the Southern Ry.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries on Plate VI. When the office and quarry are in different locations the office address is given after the company name. The quarry companies are given by States and by counties, which are arranged alphabetically.

*Limestone operators in Alabama*

Company	Map reference No., Plate VI	Quarry at—
<b>Bibb County:</b> Southern Roads Co., 819 American Trust Building, Birmingham, Ala.	17	Woodstock.
<b>Blount County:</b> Cheney Lime Co.....	9	Allgood.
<b>Calhoun County:</b> Anniston Lime Co., Anniston, Ala.....	3	Tredegar.
<b>Etowah County:</b> C. M. Noble, Lessee, Gulf States Steel Co., Anniston, Ala.	4	Cobb (near).
East Quarry Co., R. F. D. No. 1, Glencoe, Ala.....	6	Gadsden.
Anniston Lime Co., Anniston, Ala.....	5	Rock Springs.
The Alabama Co., Birmingham, Ala.....	5	Do.
Woodstock Operating Corporation, Anniston, Ala.	6	Gadsden.
La Garde Lime & Stone Co., Anniston, Ala..	5	Rock Springs.
<b>Franklin County:</b> Foster & Creighton, 807 First National Bank Building, Nashville, Tenn.	5	Do.
<b>Jefferson County:</b> Dolcite Quarry Co., 2118 First Avenue, Birmingham, Ala.	6	Gadsden.
McDonough Ore & Mining Co., 1903 Jefferson County Bank Building, Birmingham, Ala.	5	Rock Springs.
Tennessee Coal, Iron & R. R. Co., Brown-Marx Building, Birmingham, Ala.	5	Do.
Stoss Sheffield Steel & Iron Co., Birmingham, Ala.	6	Gadsden.
<b>Morgan County:</b> W. B. McCulloch, Albany, Ala.....	5	Rock Springs.
<b>Shelby County:</b> Calera Development Co., Calera, Ala.....	5	Do.
Calera Lime Works, Calera, Ala.....	7	La Garde.
Keystone Lime Works.....	8	Rockwood.
Cheney Lime Co., Allgood, Ala.....	10	Dolcite.
Longview Lime Works, Longview, Ala.....	10	Gate City.
Newala Lime Works.....	10	Ketona.
Saginaw Lime & Stone Co., Longview, Ala.....	10	Vanns.
Saginaw Lime & Lumber Co.....	11	N. Birmingham.
O'Neals Lime Works, Calera, Ala.....	11	N. Birmingham.
<b>Talledega County:</b> Alabama Marble Co.....	7	New Decatur.
	15	Calera.
	14	Eureka.
	15	Roberta.
	12	Keystone.
	13	Wilmay.
	13	Saginaw.
	15	Newala.
	13	Saginaw.
	13	Do.
	12	Pelham.
	14	Varnons.
	16	Gantts Quarry.

*Limestone operators in Georgia*

Company	Map reference No., Plate VI	Quarry at—
<b>Dade County:</b> Hooker Crushed Stone Co., Chattanooga, Tenn.	1	Hooker.
<b>Polk County:</b> Georgia Cement & Limestone Co, Birmingham, Ala.	2	Portland, Ga.

## OHIO

As study of Plate VII will show, limestone quarries in the Ohio coal-mining region are few, the greatest limestone developments being some distance west of the coal mines from the Sandusky and Toledo district south. The few quarries near the coal mines are described in the following paragraph, beginning at the southern area.

A quarry at Monroe, southern Jackson County, is readily available to the Jackson coal field to the north on the Baltimore & Ohio R. R., and to the coal field of northern Lawrence and eastern Scioto Counties to the south on the Baltimore & Ohio R. R., and further south to the Ironton coal fields by way of the Baltimore & Ohio R. R. and the Detroit, Toledo & Ironton R. R. A quarry at Logan, Hocking County, is close to the Hocking field and readily accessible thereto over the Hocking Valley Ry. A quarry at Fultonham, in southwestern Muskingum County, is within the Crooksville coal area. This quarry is operated by the Pittsburgh Plate Glass Co. and the excess of fines is so great that a 2,500-barrel per day cement plant has been erected to use up the fine materials. It might also serve the Hocking coal field to the south over the Zanesville & Western Ry. and is available to the Cambria field to the east over the Zanesville & Western Ry. to Zanesville, and from thence by the Baltimore & Ohio R. R. or the Pennsylvania R. R. The northern Crooksville coal field might be supplied from a limestone-grinding plant near Zanesville. A quarry at Rayland, in southeastern Jefferson County on the Ohio River, is within the Pittsburgh No. 3 coal area. The Pennsylvania R. R. affords service north, south, and west. A quarry at Sugar Creek on the Wheeling & Lake Erie Ry. in Tuscarawas County is within the western part of the Goshen field. A quarry at North Industry, Stark County, on the Baltimore & Ohio R. R., is within the eastern part of the Massillon field, and one at East Sparta, further south on the same line, is within the Goshen coal field. A quarry at Lisbon, Columbiana County, is within the Lisbon coal field and from Lisbon distribution may be made over the lines of the Erie R. R., the Pittsburgh, Lisbon & Western R. R., or the Youngstown & Ohio River R. R. Quarries near Lowellville, Mahoning County, and the many large fluxing stone quarries of the New Castle district, Lawrence County, Pa., constitute a very important source of supply for Pennsylvania and Ohio. However, the railway lines connecting with the Ohio coal fields are not direct, though it might be feasible to ship over the Baltimore & Ohio R. R., the Pennsylvania R. R., the Erie R. R., or the New York Central R. R. to the Lisbon, Palmyra, and Massillon fields.

The above quarries are the chief sources of supply near the coal mines. Very important limestone-quarrying industries are located in northern and central Ohio, and as the supply is abundant and

the railway lines direct, shipment may be found feasible from these districts into the eastern Ohio coal fields. The more important quarries with their rail connections are given in the following paragraphs, beginning at the southern part of the State.

A quarry at Peebles, Adams County, is available to the Ironton field via the Norfolk & Western Ry., or to the Jackson field via the Norfolk & Western Ry. and the Baltimore & Ohio R. R. Quarries at Greenfield, Highland County, and at New Vienna, Wilmington, and Melvin, Clinton County, are directly available to the Jackson field over the Baltimore & Ohio R. R. via Chillicothe. A quarry at Port William in northern Clinton County on the Detroit, Toledo & Ironton R. R. could ship via the Baltimore & Ohio R. R. at Octa, or over the Detroit, Toledo & Ironton R. R. to the Jackson field via Jeffersonville and Waverly. Quarries near Springfield, Clark County, could also ship southeastward via the Detroit, Toledo & Ironton R. R. or eastward to Columbus over the Cleveland, Cincinnati, Chicago & St. Louis Ry. and thence to the central coal fields.

Very extensive limestone industries are near Columbus in Franklin county, and the Baltimore & Ohio R. R., Pennsylvania R. R., and the Hocking Valley Ry. afford direct access to many coal regions in eastern central Ohio. Quarries near Delaware, Delaware County, could ship via Columbus over the Hocking Valley Ry., the Cleveland, Cincinnati, Chicago & St. Louis Ry., or the Pennsylvania R. R. Quarries at Bellefontaine and Rushsylvania, Logan County, if not too remote could ship via Columbus over the Toledo and Ohio Central Ry. Quarries at Marion and Owens, Marion County, might ship southward over the Hocking Valley Ry. or the Pennsylvania R. R. to Columbus and thence east, or directly east over the Cleveland, Cincinnati, Chicago & St. Louis Ry. to Mansfield and from there over the Pennsylvania R. R. to the Massillon and Goshen fields. Quarries near Kenton in Hardin County could ship eastward over the Erie Ry. via Marion. Quarries at Ada, Dunkirk, and Forest in northern Hardin County are on the Pennsylvania R. R. with a direct route east to the Massillon field. Quarries at Arlington, Hancock County, and at Spore, Crawford County, both on the Toledo and Ohio Central Ry., have easy access to the Pennsylvania R. R. passing through Bucyrus. Important limestone and lime industries are centered at Carey, Wyandot County, and at Findlay and Vanlue, Hancock County. Transportation over the Cleveland, Cincinnati, Chicago & St. Louis Ry. from Findlay to Carey and from thence eastward over the Akron, Canton & Youngstown Ry. to Akron would convey materials within easy reach of the northern coal fields. An alternative route southeast from Carey to Upper Sandusky over the Hocking Valley Ry., and thence east via the Pennsylvania R. R. might be preferable.

As indicated on the maps, important limestone quarries and lime plants are numerous in the north central counties in the Sandusky and Toledo districts. In general the best routes from these quarries to the coal fields appear to be over the Wheeling and Lake Erie Ry., or the Baltimore & Ohio R. R. Such a network of railways exists throughout this territory that each shipper can best work out his own transportation routes, therefore no attempt will be made to outline the rail connections.

No specific mention has been made of the quarries in the two western tiers of counties. Transportation of dusting material from these counties in any large quantity is unlikely in view of the distance to be traversed and the many quarries more conveniently situated. However, as excellent transportation facilities are available, and as quite a number of important operations are to be found in this territory, the operators are listed and their quarry locations mapped.

Important gypsum mines are located at Port Clinton and Gypsum, Ottawa County, and at Castalia, Erie County. Both gypsum and anhydrite or mixtures of the two are available. The Ottawa County mines are on the New York Central R. R. which connects with the Wheeling and Lake Erie Ry., at Huron. Castalia is on the Cleveland, Cincinnati, Chicago & St. Louis Ry., and the Lake Erie Western R. R. Shipment to the coal fields could be made via Sandusky or south to a junction with the Wheeling & Lake Erie Ry.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown on the map in Plate VII. When the office and quarry are in different places, the office address is given after the company name. The companies are given by counties which are arranged alphabetically.

#### *Limestone operators in Ohio*

Company	Map reference No., Plate VII	Quarry at—
<b>Adams County:</b>		
Basic Products Co., 2119 Oliver Building, Pittsburgh, Pa.	89	Peebles.
<b>Allen County:</b>		
W. H. Krofft, R. F. D. No. 2, Ada, Ohio----	51	Ada (near).
T. C. Long Estate, R. F. D. No. 7, Lima, Ohio	55	Allentown.
Bluffton-Lewisburg Stone Co., 406 Opera House Block, Lima, Ohio.	38	Bluffton.

*Limestone operators in Ohio—Continued*

Company	Map reference No., Plate VII	Quarry at—
<b>Allen County—Continued</b>		
E. J. Ford.....	57	Delphos, R. F. D. No. 6.
Snever Stone Quarry.....	57	Delphos, R. F. D. No. 1.
Auglaize Stone Co., Wapakoneta, Ohio.....	60	Buckland (near).
Geo. Gahman.....	56	Elida.
Harrod Stone Co.....	53	Harrod.
Watt Bros. Stone Co.....	52	La Fayette.
G. R. Felter.....	54	Lima, R. F. D. No. 2.
Lima Stone Co.....	54	Lima.
The National Quarries Co., Carey, Ohio.....	54	Do.
Spencer Stone Co.....	59	Spencerville.
Loy & Creps, Westminster, Ohio.....	53	Westminster.
	53	Harrod (near).
<b>Clark County:</b>		
National Mortar & Supply Co., 1005 Federal Reserve Building, Pittsburgh, Pa.	72	Cold Springs.
The Moores Lime Co., Box 622, Springfield, Ohio.	72	Do.
Mills Bros.....	72	Springfield.
<b>Clermont County:</b>		
John King, R. F. D. No. 2, Batavia, Ohio.....	88	Williamsburg.
<b>Clinton County:</b>		
C. C. Beam.....	81	Melvin.
N. S. Gregory.....	80	New Vienna.
A. I. Achor.....	80	Do.
John Connor.....	83	Wilmington.
Port William Stone Co.....	82	Port William.
Wilmington Crushed Lime Stone Co., Wilmington, Ohio.	81	Melvin.
Melvin Stone Co.....	81	Do.
<b>Columbiana County:</b>		
Lisbon Lime Co.....	44	Lisbon.
<b>Crawford County:</b>		
The Brokensword Stone Co., Bucyrus, Ohio.....	42	Spore.
<b>Delaware County:</b>		
Delaware Blue Limestone & Contracting Co.....	66	Delaware.
Scioto Lime & Stone Co.....	67	White Sulphur.
<b>Erie County:</b>		
Kelley Island Lime & Transport Co., 1125 Leader-News Building, Cleveland, Ohio.	13	Kelleys Island.
Lake Shore Stone Products Co.....	15	Sandusky.
The Wagner Quarries Co.....	15	Do.
<b>Franklin County:</b>		
Wm. Miller, 1422 West Broad Street, Columbus, Ohio.	74	Columbus.
Mecklin Stone Co., McKinley Avenue, Columbus, Ohio.	74	Do.
Ohio State Penitentiary, Columbus, Ohio.....	73	Sullivant.
Marble Cliff Quarries Co., 907 Hartman Building, Columbus, Ohio.	73	Marble Cliff.
<b>Greene County:</b>		
Ohio Marl Co., 803 Commercial Building, Dayton, Ohio.	84	Spring Valley.
<b>Hamilton County:</b>		
Floyd Campbell, Box 242, Loveland, Cincinnati, Ohio.	87	Cincinnati.

*Limestone operators in Ohio—Continued*

Company	Map refer- ence No., Plate VII	Quarry at—
<b>Hancock County:</b>		
Bluffton-Lewisburg Stone Co., 406 Opera House Block, Lima, Ohio.	39	Arlington.
The Tarbox-McCall Stone Co.-----	30	Findlay.
The Hancock Stone Co.-----	30	Do.
Clo. Edgington-----	30	Do.
Molder Bros., 810 Wilson Street, Findlay, Ohio.	39	Arlington.
Cole Bros.-----	40	Vanlue.
<b>Hardin County:</b>		
Tessel Stone Co.-----	51	Ada.
Hardin Quarry Co.-----	49	Dunkirk.
The France Quarries Co., 1800 Second National Bank Building, Toledo, Ohio.	49	Kenton.
Chas. C. Wagner-----	49	Dunkirk.
Jno. Herzog & Son-----	50	Kenton.
	48	Forest.
<b>Highland County:</b>		
H. E. Terrell, New Vienna, Ohio-----	79	Highland.
The Greenfield Stone Co., 2103 Union Central Building, Cincinnati, Ohio.	78	Greenfield.
<b>Hocking County:</b>		
A. H. Patton-----	77	Logan.
<b>Huron County:</b>		
Higgins Stone Co.-----	23	Bellevue.
Thompson Township Trustees-----	23	Bellevue, R. F. D. No. 4.
<b>Jackson County:</b>		
South Webster Brick Co., Chillicothe, Ohio--	90	Monroe.
<b>Jefferson County:</b>		
A. Jackson & Bros., Tiltonsville, Ohio-----	65	Rayland.
<b>Logan County:</b>		
Niagara Stone Products Co.-----	68	Bellefontaine.
A. M. Hempy-----	62	Rushsylvania.
<b>Lucas County:</b>		
France Stone Co., 1800 Second National Bank Building, Toledo, Ohio.	3	Holland.
Toledo Stone & Glass Sand Co., 321 Terminal Building, Toledo, Ohio.	4	Waterville.
Sylvania Stone Co., 2256 Rosewood Avenue, Toledo, Ohio.	2	Silica (P. O., Syl- vania).
White House Stone Co., 660-661 Spitzer Building, Toledo, Ohio.	1	Sylvania.
	4	Whitehouse.
<b>Mahoning County:</b>		
Mahoning Limestone Co., Carnegie Building, Pittsburgh, Pa.	43	Lowellville.
<b>Marion County:</b>		
Daniel Evans Stone Co.-----	47	Marion.
John Evans Lime & Stone Co.-----	47	Do.
Ohio Blue Limestone Co.-----	47	Do.
J. M. Hamilton, R. F. D. No. 4, Marion, Ohio.	47	North Marion.
Kelley Island Lime & Transport Co., 1125 Leader-News Building, Cleveland, Ohio.	47	Marion.
Jno. D. Owens & Son-----	63	Owens.
<b>Mercer County:</b>		
John W. Karch & Co., R. F. D. No. 5, Celina, Ohio.	61	Celina (5 miles west).



*Limestone operators in Ohio—Continued*

Company	Map reference No., Plate VII	Quarry at—
<b>Miami County:</b>		
The Ohio Marble Co., Wayne and Ash Streets, Piqua, Ohio.	69	Piqua.
Casparis Stone Co., Clinton Building, Columbus, Ohio.	69	Do.
<b>Montgomery County:</b>		
Casparis Stone Co., Clinton Building, Columbus, Ohio.	85	Centerville.
Wiggin Crushed Stone & Sand Co.-----	86	Germantown.
<b>Muskingum County:</b>		
Pittsburgh Plate Glass Co., Limestone Products Department, Columbia Chemical Division, Zanesville, Ohio.	76	Fultonham.
Colgan Lime Stone Products Co., New Hayden Building, Columbus, Ohio.	75	Zanesville (grinding plant).
<b>Ottawa County:</b>		
Kelley Island Lime & Transport Co., 1125 Leader-News, Cleveland, Ohio.	5	Clay Center.
United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.	14	Marblehead.
Benton Stone Co.-----	6	Genoa.
Rocky Ridge Lime & Stone Co., 321 Terminal Building, Toledo, Ohio.	10	Oakharbor.
	9	Rockyridge.
<b>Paulding County:</b>		
J. S. Plosser, Cloverdale, Ohio.-----	31	Oakwood.
Wm. A. Martin, R. F. D. No. 3, Cloverdale.	31	Do.
<b>Preble County:</b>		
Bluffton-Lewisburg Stone Co., 406 Opera House Block, Lima, Ohio.	71	Lewisburg.
The France Quarries Co., 1800 Second National Bank Building, Toledo, Ohio.	70	New Paris.
<b>Putnam County:</b>		
Fort Jennings Stone Co.-----	35	Fort Jennings.
Lanwehr & Goetschius.-----	32	Ottawa.
Nicholas Lauer.-----	34	Ottoville.
Schumacher Stone Co.-----	37	Pandora.
Bluffton-Lewisburg Stone Co., 406 Opera House Block, Lima, Ohio.	36	Rimer.
<b>Sandusky County:</b>		
France Stone Co., 1800 Second National Bank Building, Toledo, Ohio.	23	Bellevue.
The Higgins Stone Co.-----	23	Do.
Gottron Bros. Co.-----	17	Fremont.
Swint Bros. Stone Co.-----	17	Do.
Riverside Stone Co.-----	17	Do.
National Mortar & Supply Co., Pittsburgh, Pa.	18	Gibsonburg.
Kelley Island Lime & Transport Co., 1125 Leader-News Building, Cleveland, Ohio.	18	Do.
The Ohio Hydrate & Supply Co.-----	8	Sandusky.
Woodville Lime Products Co., 1341-48 Nicholas Building, Toledo, Ohio.	8	Woodville.
Federal Lime & Stone Co., Williamson Building, Cleveland, Ohio.	8	Do.
Standard Lime & Stone Co., 524 Equitable Building, Baltimore, Md.	8	Do.
Washington Building Lime Co., Buckeystown, Md.	8	Do.

*Limestone operators in Ohio—Continued*

Company	Map reference No., Plate VII	Quarry at—
<b>Seneca County:</b>		
National Lime & Stone Co., Carey, Ohio-----	28	Bascom.
The France Co., 1800 Second National Bank Building, Toledo, Ohio.	26	Bloomville.
Thompson Township Quarry, Township Trustees.	27	Tiffin.
Byron Jones-----	24	Flat Rock.
Kelley Island Lime & Transport Co., 1125 Leader-News Building, Cleveland, Ohio.	29	Fostoria.
Weot Lime & Stone Co-----	21	Kansas.
Dolomite Products Co., 1110 Euclid Avenue, Cleveland, Ohio.	27	Tiffin.
J. F. Wolf-----	27	Do.
Consumers Lime Co., Fairmont, W. Va-----	22	Maple Grove.
<b>Stark County:</b>		
East Sparta Clay & Lime Co-----	25	Scipio Siding.
Agricultural & Commercial Lime Co., 526-531 Reukert Building, Canton, Ohio.	27	Tiffin.
<b>Tuscarawas County:</b>		
A. C. Schlabach-----	45	East Sparta.
Shepfer & Moomaw Bros-----	45	North Industry.
<b>Van Wert County:</b>		
The Limestone Quarries Co., Delphos, Ohio..	64	Sugarcreek.
The France Co., 1800 Second National Bank Building, Toledo, Ohio.	64	Do.
Huysman & Kalt-----	33	Delphos (near).
Wayne County:	58	Wetsel.
Blue Knob Crushed Stone Co., Wooster, Ohio.	33	Middlepoint.
Wood County:	33	Delphos (near).
France Stone Co., 1800 Second National Bank Building, Toledo, Ohio.	46	Fredericksburg.
Luckey Lime & Supply Co-----	20	North Baltimore.
Wood County Stone & Construction Co., Bowling Green, Ohio.	7	Luckey.
Wyandot County:	19	Portage.
National Lime & Stone Co., Carey, Ohio-----	41	Carey.

*Gypsum and anhydrite operators in Ohio*

Company	Map reference No., Plate VII	Mine at—
<b>Erie County:</b>		
Kelly Plaster Co., Butler, Pa., and Sandusky, Ohio.	16	Castalia.
<b>Ottawa County:</b>		
United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.	12	Gypsum.
Beaver Products Co., Inc., American Cement Plaster Division.	12	Do.
American Gypsum Co-----	11	Port Clinton.

## INDIANA

The producing coal district of Indiana is confined to the southwestern counties, and there are very few active limestone quarries near the coal fields. A quarry at Evansville, Vanderburg County, is within the Evansville-Newburg coal field, and several railway lines are available. The limestones near Evansville might also supply the coal fields in adjacent Kentucky counties. A quarry at Cannelton, Perry County, is very convenient to the Cannelton coal mines. Quarries at Webster and Irvington, Breckenridge County, Ky., are also within easy reach over the Louisville, Henderson & St. Louis Ry. Aside from the quarries at Cannelton and Evansville, very little limestone is available within the coal-mining regions.

As Plate VIII shows, the limestone quarries of Indiana that lie outside the coal fields are in three main groups: A southwestern group bordering or adjacent to the coal fields, a southeastern group, and a scattered north and northeastern group. The first group is the most readily available, and contains many very important quarries and stone-mill operations, particularly those in and about Bedford and Oolitic, Lawrence County, and Bloomington, Monroe County. These companies are the producers of the well-known Indiana oolitic limestone widely used for building purposes. Much waste is incidental to the process of quarrying and cut-stone manufacture, hence there should be a great deal of waste material available for coal-mine dusting. Bedford has direct connection with the Knox and Daviess County coal fields via the Baltimore & Ohio R. R. and with the Sullivan-Linton field over either the Chicago, Indianapolis & Louisville R. R. or the Chicago, Terre Haute & Southeastern Ry. The waste limestone from the numerous mills in the Bloomington and Clear Creek districts could be shipped directly to the Sullivan-Linton fields via the Illinois Central R. R.

South of Bedford, a lime-plant quarry at Mitchell, southern Lawrence County, is within easy reach of the Knox and Daviess County coal fields over the Baltimore & Ohio R. R. Another lime-plant quarry at Salem, Washington County, might supply the same coal fields over the Chicago, Indianapolis & Louisville Ry. and the Baltimore & Ohio R. R. via Mitchell, or south from Orleans over the Southern Ry. to the Princeton-Ayrshire coal fields. Quarries at Sellersburg and Jeffersonville on the Pennsylvania R. R. in Clark County could ship over the Southern Ry. via New Albany to the Princeton-Ayrshire coal mines or south from Huntingburg to the Boonville and Evansville-Newburg coal fields. The same route is available to quarries directly on the Southern Ry. at Edwardsville and Georgetown in Floyd County and Milltown and Marengo in Crawford County. As noted on page 38, a quarry near West York in

Crawford County, Ill., is a possible source of supply for either the Sullivan-Linton or the Clinton coal districts.

North of Bloomington operators at Stinesville and Ellettsville could ship over the Chicago, Indianapolis & Louisville Ry. and the Illinois Central R. R. via Bloomington. Quarries at Spencer and Freedom on the Pennsylvania R. R. in Owen County have a direct railway line either to the Sullivan-Linton or the Knox County coal districts. Quarries at Putnamville and Cloverdale in southern Putnam County could utilize the same line by shipping southward over the Chicago, Indianapolis & Louisville R. R. to Gosport Junction or north to Greencastle, from which point the product of several quarries in the immediate district could be shipped over either the Pennsylvania R. R. or the Cleveland, Cincinnati, Chicago & St. Louis Ry. to the Clinton and Brazil coal fields.

The southeastern group of quarries is farther from the coal mines, but transportation is fairly direct. The quarry of the group farthest south is at Madison, Jefferson County. Shipments could be made north over the Pennsylvania R. R. to North Vernon and from thence west by the Baltimore & Ohio R. R. to the Knox and Daviess County coal mines. Quarries at Osgood in Ripley County and at Nebraska in Jennings County are on the same line. A quarry at Grammer in Bartholomew County could ship directly over the Chicago, Milwaukee & St. Paul Ry. to the Sullivan-Linton field. Quarries further east at Letts, Greensburg, and New Point, Decatur County, and at Milroy, Rush County, are all on the Cleveland, Cincinnati, Chicago & St. Louis Ry. Shipment could be made over this line to the Clinton and Brazil coal mines via Indianapolis, but other routes are also available.

In the northern and northeastern group, quarries at Alexandria and Ingalls, Madison County, and at Yorktown and Muncie, Delaware County, all on the Cleveland, Cincinnati, Chicago & St. Louis Ry., may ship by direct line via Indianapolis to the Clinton and Brazil coal mines. A quarry near Albany, in Delaware County, on the Lake Erie & Western R. R. could ship as above via Muncie. A quarry at Ridgeville in northern Randolph County on the Pennsylvania R. R. could route material via Redkey and Muncie. Limestone quarries near Bluffton, Wells County, are available to the Lake Erie & Western R. R. and the Toledo, St. Louis & Western R. R. Kokomo in Howard County, near which is at least one active limestone quarry, is served by the Toledo, St. Louis & Western R. R., the Lake Erie & Western R. R., and the Pennsylvania R. R. Several alternative routes to the coal mines are available. Quarries at Huntington, Huntington County, at Logansport and Kenneth, Cass County, at Monon, White County, and at Delphi, in Carrol County, are well served by railways, but so many alternative routes are pos-

sible that each operator can best work out his most economical route. A quarry at Kentland, Newton County, could ship south over the New York Central R. R. Probably the best route to the Clinton and Brazil coal fields would be via Danville, Ill., which could also serve the Danville coal region.

LOCATION OF COMPANIES

A list of the companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting, but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate VIII. When the office and quarry are in different locations, the office address is given after the company name. The quarry companies are given by counties, which are arranged alphabetically.

*Limestone quarry operators in Indiana*

Company	Map reference No., Plate VIII	Quarry at —
<b>Bartholomew County:</b>		
Chas. Waughtel, Elizabethtown, Ind.-----	41	Grammer.
<b>Carroll County:</b>		
Delphi Lime Co.-----	5	Delphi.
<b>Cass County:</b>		
Casparis Stone Co., Clinton Building, Columbus, Ohio.	3	Kenneth.
Logansport Stone & Lime Co., Huntington, Ind.	4	Logansport.
<b>Clark County:</b>		
Staebler Construction Co.-----	33	Jeffersonville.
Thos. F. O'Neil-----	33	Do.
Utica Lime Co.-----	30	Sellersburg.
<b>Crawford County:</b>		
Marengo Limestone Co.-----	28	Marengo.
Louisville Cement Co., 315 Guthrie Street, Louisville, Ky.	29	Milltown.
<b>Decatur County:</b>		
Geo. S. Littell, 813 East Main Street, Greensburg, Ind.	39	Greensburg.
Thomson & Davis-----	39	Do.
Louis Volles-----	39	Do.
Layton Bros., R. F. D. No. 1, Westport, Ind.	38	Letts.
New Point Stone Co.-----	40	New Point.
Greeley Stone Co.-----	37	St. Paul.
C. R. Yater-----	37	Do.
St. Paul Stone Quarries Co.-----	37	Do.
<b>Delaware County:</b>		
Muncie Stone & Lime Co.-----	13	Muncie.
Union Fibre Co., Winona, Minn.-----	12	Yorktown.
<b>Floyd County:</b>		
Louis F. Knable, R. F. D. No. 4, New Albany, Ind.	32	Edwardsville.
John Hodgins-----	31	Georgetown.

*Limestone quarry operators in Indiana—Continued*

Company	Map reference No., Plate VIII	Quarry at —
<b>Harrison County:</b>		
Louisville Cement Co., 315 Guthrie Street, Louisville, Ky.	29	Milltown (near).
<b>Howard County:</b>		
Kokomo Stone Co., 612 West Markland Ave- nue, Kokomo, Ind.	8	Kokomo.
<b>Huntington County:</b>		
Erie Stone Co., 1800 Second National Bank Building, Toledo, Ohio.	6	Huntington.
Kelley Island Lime & Transport Co., 1125 Leader-News Building, Cleveland, Ohio.	6	Do.
Farmers Limestone Co.	6	Do.
<b>Jefferson County:</b>		
Miles & Thomas, R. F. D. No. 9, Madison, Ind.	45	Madison (near).
<b>Jennings County:</b>		
Harvey Grimstead & Sons	43	Nebraska.
W. M. Hulse	44	Vernon.
<b>Lawrence County:</b>		
Bedford Ground Limestone Co.	25	Bedford.
Wm. M. Brown, Oolitic, Ind.	25	Do.
The Consolidated Stone Co.	25	Do.
Doyle Stone Co., 103 Park Avenue, New York, N. Y.	25	Do.
Inter-State Cut Stone Co.	25	Do.
The Furst-Kerber Cut Stone Co., 2301 South La Salle Street, Chicago, Ill.	25	Do.
Imperial Stone Co., Bedford, Ind.	24	Peerless.
Ingalls Stone Co., Bedford, Ind.	24	Do.
Shea & Donnelly Co., Inc.	25	Bedford.
Bedford Stone Products Co.	25	Do.
Lehigh Lime Co., Allentown, Pa.	26	Mitchell.
The Indiana Quarries Co., 112 West Adams Street, Chicago, Ill.	25	Oolitic.
	25	Bedford.
	25	Do.
W. McMillan & Son, Bedford, Ind.	24	Peerless.
<b>Madison County:</b>		
Banner Rock Products Co.	11	Alexandria.
General Insulating & Manufacturing Co.	11	Do.
Big Four Stone Co.	14	Ingalls.
<b>Marion County:</b>		
Allied Coal Materials Co.	14A	Indianapolis.
<b>Monroe County:</b>		
Bloomington-Bedford Stone Co.	22	Bloomington.
The Consolidated Stone Co., Bedford, Ind.	22	Do.
Crescent Stone Co.	22	Do.
Hunter Bros. Stone Co.	22	Do.
Mathers Stone Co., 437 Postal Telegraph Building, Chicago, Ill.	22	Do.
Monroe County Oolitic Stone Co.	22	Do.
National Stone Co.	22	Do.
John S. Rogers	22	Do.
Oolitic Operative Quarries Co., Bloomington, Ind.	23	Clear Creek.
American Oolitic Stone Co.	22	Bloomington.
Star Stone Co., 112 West Adams Street, Chi- cago, Ill.	22	Do.
United Indiana Stone Co.	22	Do.
The Chicago & Bloomington Stone Co., 102½ South College Avenue, Bloomington, Ind.	23	Clear Creek or San- ders.

*Limestone quarry operators in Indiana—Continued*

Company	Map reference No., Plate VIII	Quarry at—
<b>Monroe County—Continued.</b>		
Alexander King Stone Co., Box 104, Bloomington, Ind.	21	Ellettsville.
Monarch Quarries Co., Bloomington, Ind.	23	Clear Creek.
Perry Stone Co.	21	Ellettsville.
Hunter Valley Stone Co.	22	Bloomington (near).
W. McMillan & Son, Bedford, Ind.	23	Sanders.
Empire Stone Co., Bloomington, Ind.	23	Do.
Hoadley & Sons Co., Bloomington, Ind.	20	Stinesville.
Swenson Stone Co., Urbana, Ill.	20	Do.
Illinois Steel Co., 208 South La Salle Street, Chicago, Ill.	20	Do.
Bowman-King Stone Co., Bloomington, Ind.	23	Sanders.
Reed-Powers Cut Stone Co., Bedford, Ind.	23	Victor.
<b>Newton County:</b>		
Newton County Stone Co.	1	Kentland (near).
<b>Owen County:</b>		
Casparis Stone Co., Clinton Building, Columbus, Ohio.	19	Romona.
Farmers Limestone Co.	18	Freedom.
Midwest Crushed Stone Quarries Co., 508 Traction Terminal Building, Indianapolis, Ind.	19	Spencer.
Spencer Stone Co., 1205 National City Bank Building, Indianapolis, Ind.	19	Do.
<b>Perry County:</b>		
Pavlin Construction Co.	35	Cannelton.
<b>Putnam County:</b>		
Hendrix Bros.	17	Cloverdale.
Thos. J. McCommack, R. F. D. No. 2, Fillmore, Ind.	15	Greencastle.
Ohio & Indiana Stone Co., 1800 Second National Bank Building, Toledo, Ohio.	15	Do.
Midwest Crushed Stone Quarries Co., 508 Traction Building, Indianapolis, Ind.	15	Do.
Indiana State Farm, R. F. D. No. 7, Greencastle, Ind.	16	Putnamville.
S. W. Colliver, Cloverdale, Ind.	16	Do.
<b>Randolph County:</b>		
Albany Limestone Co.	9	Albany (near).
Midwest Crushed Stone Quarries Co., 508 Traction Terminal Building, Indianapolis, Ind.	10	Ridgeville.
<b>Ripley County:</b>		
Osgood Limestone Co.	42	Osgood.
<b>Rush County:</b>		
Chas. Owens.	36	Milroy.
<b>Vanderburg County:</b>		
Chas. & Henry Rodenberg, R. F. D. No. 8, Evansville, Ind.	34	Evansville (near).
<b>Washington County:</b>		
Hoosier Lime Co.	27	Salem.
<b>Wells County:</b>		
Erie Stone Co., Toledo, Ohio.	7	Bluffton.
<b>White County:</b>		
Monon Crushed Stone Co.	2	Monon.

## ILLINOIS

Active limestone quarries are numerous in Illinois, particularly in the Chicago and East St. Louis districts, but very few quarries are in operation throughout the central part of the State. Quarries at Rosiclare, Hardin County, and near Golconda, Pope County, on the Illinois Central Ry. are fairly near the southern Illinois coal mines. A quarry at White Hill near Cypress, Johnson County, has direct connection over the Chicago & Eastern Illinois R. R. with the coal mines of Williamson and Franklin Counties. Quarries near Anna, Union County, could furnish supplies to the same region via the Illinois Central R. R.

Limestone for the southern part of the Belleville coal area might be obtained from a quarry near Chester, in southern Randolph County, via the Wabash, Chester & Western R. R. or the Illinois Southern Ry.; or from Red Bud in northern Randolph County on the Mobile & Ohio R. R. Quarries at Belleville and East St. Louis in St. Clair County are admirably situated to supply the northern Belleville coal district. Quarries near Krause, St. Clair County, and Columbia, Valmeyer, and Maeystown, Monroe County, could also supply material for the same district via the Mobile & Ohio and the Missouri Pacific R. R. A quarry in Madison County not far from Jamestown in Clinton County is the nearest source of supply for the coal mines of Bond and Clinton Counties, but the material may be unavailable through lack of railroad facilities.

Quarries at Elsay and Grafton, Jersey County, on the Chicago, Peoria & St. Louis R. R. and several quarries in the vicinity of Alton in Madison County served by several railway lines constitute sources of supply for the adjacent coal mines in the southern part of the central Illinois coal fields, or the northern part of the Belleville coal region.

Aside from quarries near Litchfield, Montgomery County, active limestone operations are notably lacking throughout the central Illinois coal district, but direct railway service is available to the quarries of either the Alton or the East St. Louis limestone districts. A quarry at Griggsville, Pike County, has direct connection over the Wabash Ry. with the central Illinois coal mines in the Springfield district. An important limestone quarry industry exists in Adams County in the vicinity of Quincy. The Wabash Ry. also connects this region with the coal mines near Springfield. In eastern Illinois a quarry in Clark County not far from West York in Crawford County on the Cleveland, Cincinnati, Chicago & St. Louis Ry. is better located to serve the Indiana coal mines than it is to supply material to Illinois. Shipment might be made south via Robinson on the Illinois Central Ry. to the Sullivan-Linton coal district, or north via Marshal Junction on the Pennsylvania R. R. to the Clinton



coal fields in and about Terre Haute. Quarries at Fairmount, Vermilion County, on the Wabash Ry. are just on the western edge of the Danville coal district.

A quarry near Gladstone, Henderson County, could be most readily utilized by the Rock Island coal mines over the Chicago Burlington & Quincy R. R. and the Rock Island Southern Ry. A quarry near Rock Island City is near the coal mines of that region.

The most important limestone quarry region of the State is in the northeast, in and about Chicago. Quarries at Lehigh and Kankakee, Kankakee County, on the New York Central R. R., are not far from the Wilmington coal district, though not on the most direct railway line. A quarry at Manhattan, many quarries near Joliet, and very extensive limestone operations at Chicago, LaGrange, Lemont, Hillside, Lyons, Thornton, Elmhurst, and Batavia afford an abundant supply of pulverized limestone. Railroad facilities are excellent either to the Wilmington or the northern Illinois coal fields.

A quarry at Dixon, Lee County, is available to the northern Illinois coal mines via the Illinois Central R. R. and one at Nelson in the same county via the Chicago & Northwestern Ry. and the Chicago, Burlington & Quincy R. R. Quarries in the extreme north near Leaf River, Ogle County; Freeport, Stephenson County; Durand, Rockford, and Rockton, Winnebago County; and Belvidere, Boone County, are possible sources of supply for the coal mines of northern Illinois with fairly direct railroad connection.

Cement-plant quarries are not generally included in this report as sources of supply of dusting materials (except those that produce stone as well as cement), because the finely ground rock is used for the main product, cement, and would probably be more costly than the waste product from other limestone quarries. However, several large cement plants near La Salle and Oglesby in La Salle County are worth consideration because located within the northern Illinois coal fields close to several mines.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting, but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate IX. When the office and quarry are in different locations the office address is given beneath the company name. The quarry companies are given by counties arranged alphabetically.

*Limestone quarry operators in Illinois*

Company	Map reference No., Plate IX	Quarry at—		
<b>Adams County:</b>				
Marblehead Lime Co., 159 North State Street, Chicago, Ill.	26 24	Marblehead. Quincy.		
House of Correction, 1301 South Front Street, Quincy, Ill.			24	Do.
F. W. Menke Stone & Lime Co., 436 South Front Street, Quincy, Ill.	24	Do.		
Black White Lime Co., Box 405, Quincy, Ill.	25	Do.		
Roeder-Greemann Stone & Construction Co., 1100 Pason Avenue, Quincy, Ill.	25	Do.		
Roeder & Greemann, Front and Jefferson Streets, Quincy, Ill.	25	Do.		
W. D. Meyer	25	Do.		
Quincy White Lime Co.	25	Do.		
<b>Boone County:</b>				
John Fair & Co.	5	Belvidere.		
<b>Clark County:</b>				
Illinois Limestone Co., Robinson, Ill.	44	West York (near).		
<b>Cook County:</b>				
Consumers Co., 29 South LaSalle Street, Chicago, Ill.	14 12 15 14	Chicago. La Grange. Lemont. Chicago.		
Chicago Union Lime Works Co., 1900 West Nineteenth Street, Chicago, Ill.				
Superintendent, House of Correction, Twenty-sixth Street and California Avenue, Chicago, Ill.			14	Do.
Peoples Crushed Stone Co., 163 West Washington Street, Chicago, Ill.			14	Do.
Stearns Lime & Stone Co., Room 2, 154 West Randolph Street, Chicago, Ill.	4	Do.		
Dolese & Shepard Co., 108 South La Salle Street, Chicago, Ill.	12 13 10	La Grange. Hawthorne. Hillside.		
A. C. O'Laughlin Co., 131 North Homan Avenue, Chicago, Ill.				
Superior Stone Co., 5 North La Salle Street, Chicago, Ill.			12	La Grange.
Federal Stone Co., 133 West Washington Street, Chicago, Ill.	12	Do.		
Western Quarries Co., 104 South Michigan Avenue, Chicago, Ill.	15	Lemont.		
Great Lakes Dredge & Dock Co., Chicago, Ill.	15	Do.		
Riverside Lime & Stone Co., 131 West Sixty-third Street, Chicago, Ill.	13 11 18	Lyons. Riverside. Thornton.		
Brownell Improvement Co., 133 West Washington Street, Chicago, Ill.				
<b>Dupage County:</b>				
Elmhurst Chicago Stone Co.	10	Elmhurst.		
<b>Hardin County:</b>				
Fairview Fluorspar & Lead Co.	43	Rosiclare.		
<b>Henderson County:</b>				
Monmouth Stone Co., Monmouth, Ill.	22	Gladstone.		
<b>Jersey County:</b>				
Western Whiting & Manufacturing Co.	30	Elsah.		
Columbia Quarry Co., 710 Fullerton Building, St. Louis, Mo.	29	Grafton.		
<b>Johnson County:</b>				
The Charles Stone Co., Marion, Ill.	41	White Hill (near Cypress).		

*Limestone quarry operators in Illinois—Continued*

Company	Map reference No., Plate IX	Quarry at—
<b>Kane County:</b>		
John Hendrickson-----	9	Batavia.
<b>Kankakee County:</b>		
C. Ruhle-----	21	Kankakee.
Lehigh Stone Co., Kankakee, Ill.-----	20	Lehigh.
<b>Lee County:</b>		
G. L. Jeanquenot-----	8	Dixon, R. F. D. No. 4.
Chas. Atkinson, 1708 Rock Island Road, Dixon, Ill.-----	7	Nelson.
<b>Madison County:</b>		
Mississippi Lime & Material Co., 5-6-7 Booth Building, Alton, Ill.-----	31	Alton.
Reliance Whiting Co., 1800 Easton Street, Alton, Ill.-----	31	Do.
Winthrop A. Schwallenstecker, 1215 Exchange Street, Alton, Ill.-----	31	Do.
Jamestown Limestone Co., R. F. D. No. 4, Highland, Ill.-----	32	Jamestown (near)
<b>Monroe County:</b>		
Columbia Quarry Co., 710 Fullerton Street, St. Louis, Mo.-----	}	35 Valmeyer.
Valmeyer Lime & Stone Co-----		37 Maeystown.
		34 Columbia.
		35 Valmeyer.
<b>Montgomery County:</b>		
M. T. Kiggins, Hillsboro, Ill.-----	28	Litchfield.
<b>Ogle County:</b>		
J. M. Bolen-----	6	Leaf River, R. F. D. No. 2.
John Meyers-----	6	Leaf River.
<b>Pike County:</b>		
Griggsville-Perry Cooperative Limestone Association.-----	27	Griggsville.
<b>Pope County:</b>		
Golconda Portland Cement Co-----	42	Golconda (near).
<b>Randolph County:</b>		
Southern Illinois Penitentiary, Menard, Ill.-----	39	Chester.
Prairie Du Long Quarry Co.-----	38	Red Bud.
The Red Bud Quarry Co.-----	38	Do.
<b>Rock Island County:</b>		
Bettendorf Stone Co., Box 301, Davenport, Iowa.-----	16	Rock Island.
<b>St. Clair County:</b>		
St. Clair County Workhouse Quarry, superintendent.-----	36	Belleville.
Columbia Quarry Co., 710 Fullerton Building, St. Louis, Mo.-----	34	Krause.
East St. Louis Stone Co., 264 Arcade Building, East St. Louis, Ill.-----	33	East St. Louis.
Casper Stolle Quarry & Contracting Co., 408 First National Bank Building, East St. Louis, Ill.-----	33	Do.
<b>Stephenson County:</b>		
Finkbeiner Bros-----	3	Freeport.
<b>Union County:</b>		
Central Illinois Public Service Co., Springfield, Ill.-----	40	Anna.
Anna Stone Co-----	40	Do.

*Limestone quarry operators in Illinois—Continued*

Company	Map refer- ence No., Plate IX	Quarry at—
Vermilion County:		
Illinois Steel Co., Chicago, Ill.-----	23	Fairmount.
Casparis Stone Co., Clinton Building, Colum- bus, Ohio.	23	Do.
Will County:		
Wm. McFarlin & Son, R. F. D. No. 3, Elwood, Ill.	19	Manhattan.
Gross & McCowan Lumber Co.-----	17	Joliet.
Inland Crushed Stone Co., 139 North Clark Street, Chicago, Ill.	17	Do.
Illinois State Penitentiary.-----	17	Do.
Markgraf Stone Co.-----	17	Do.
Lincoln Crushed Stone Co., Patterson and Brandon Road, Joliet, Ill.	17	Do.
National Stone Co., Box 832, South Chicago Street, Joliet, Ill.	17	Do.
Swan Medin & Co., 711 Florence Avenue, Joliet, Ill.	17	Do.
Joliet Artificial Stone Co.-----	17	Do.
Winnebago County:		
John Rizner.-----	1	Durand.
Northern Illinois Supply Co., 110 North Court Street, Rockford, Ill.	4	Rockford.
Geo. W. Martin, 945 North Court Street, Rockford, Ill.	2	Ruby.
		Rockton.

**EASTERN OKLAHOMA AND ARKANSAS**

## OKLAHOMA

Supplies of limestone and gypsum are available from mines and quarries to supply dusting materials for the eastern Oklahoma coal fields. The limestone quarry that is most convenient to the southern coal fields is at Stringtown on the Missouri, Kansas & Texas Ry. in Atoka County. This quarry is just at the edge of the Lehigh coal field and only a short distance from the McAlester-Wilburton field. A quarry at Bromide, Johnston County, on the Kansas, Oklahoma & Gulf Ry. is also easily accessible to the Lehigh coal field. Quarries at Dougherty on the Gulf, Colorado & Santa Fe Ry. and at Sulphur on the St. Louis-San Francisco Ry., both in Murray County, are somewhat indirectly available to the Lehigh and McAlester-Wilburton coal fields. A cement company at Ada, Pontotoc County, is listed as a limestone producer. Both the Missouri, Kansas & Texas Ry. and the Atchison, Topeka & Santa Fe Ry. connect Ada with the Lehigh coal field. The St. Louis-San Francisco Ry. is a link between the Ada quarries and the Henryetta-Dewar coal fields to the northeast. A lime-plant quarry at Fort Towson in Choctaw County on the St. Louis-San Francisco Ry.

could ship via Hugo to the Poteau and eastern McAlester-Wilburton coal fields.

Quarries at Tulsa, Tulsa County, are readily available for use in the coal mines east and southeast of Tulsa. Supplementary sources of supply are to be found in quarries at Avant, Osage County, on the Midland Valley R. R., and at the quarry of a cement company at Dewey, Washington County, the latter company being listed as a limestone producer. The Atchison, Topeka & Santa Fe Ry. affords direct connection between Dewey and Tulsa. A quarry at Watts, Adair County, on the Kansas City Southern Ry., could supply material to the Poteau coal fields of eastern Oklahoma or the Sebastian County coal fields of western Arkansas. It is also convenient to the coal mines near Fayetteville, Washington County, Ark.

A quarry at Cushing, Payne County, on the Atchison, Topeka & Santa Fe Ry., could ship either to the coal fields of Tulsa County or south to the larger coal-mining districts in the southeast. More distant sources of supply are at Chilocco and Ponca City, Kay County, on the Atchison, Topeka & Santa Fe Ry., and near Apache, Comanche County, on the Chicago, Rock Island & Gulf Ry.

Gypsum mines at Cement, in Caddo County, and Acme, in Grady County, could ship via Chickasha to any of the eastern Oklahoma coal mines. A gypsum mine at Eldorado, in Jackson County, on the St. Louis-San Francisco Ry. is at a greater distance but could also ship to the coal mines via Chickasha. Gypsum mines at Southard and Ideal, in Blaine County, also on the St. Louis-San Francisco Ry. are additional sources of supply available to any of the coal mines.

#### ARKANSAS

No active limestone quarries are reported near the larger coal fields of western Arkansas. The coal mines east of Fayetteville, Washington County, are fortunate in having available supplies of limestone at two lime-plant quarries at Johnson and Gulley, a short distance north on the St. Louis-San Francisco Ry. Another lime-plant quarry at Monte Ne, Benton County, is also available via the same railway line. A quarry at Butterfield, Hot Springs County, on the Chicago Rock Island & Pacific Ry. could ship via Little Rock to any of the coal fields of western Arkansas. From a quarry at St. Joe, in Searcy County, on the Missouri & North Arkansas R. R., indirect transportation via Higginson and Little Rock would be required. Quarries at Williford, in Sharp County, on the St. Louis-San Francisco Ry., and at Ruddells, in Izard County, and Pfeiffer, in Independence County, on the Missouri Pacific Ry., are other possible sources of limestone, though they are far from the coal fields.

A quarry at Watts, Adair County, Okla., affords another source of supply for the Sebastian County coal fields. Shipment from other

limestone quarries or from the Oklahoma gypsum mines is also possible.

A gypsum plant was under construction at Murfreesboro, Pike County, in 1924. When in operation shipments of pulverized gypsum could be made over the Memphis, Dallas & Gulf R. R. and the Kansas City Southern Ry., via Ashdown, to the Sebastian County and adjacent coal fields of Oklahoma.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate X. When the office and quarry are in different locations the office address is given after the company name. The companies are given by States and by counties, which are arranged alphabetically.

#### *Limestone operators in Oklahoma*

Company	Map reference No., Plate X	Quarry at—
<b>Adair County:</b>		
Southern White Lime Co., Pierce City, Mo.	6	Watts.
<b>Atoka County:</b>		
Stringtown Crushed Rock Co., Kress Building, McAlester, Okla.	16	Stringtown.
<b>Choctaw County:</b>		
Fort Towson White Lime Co.	17	Fort Towson.
<b>Comanche County:</b>		
Dolese Bros. Co., 337 North Madison Street, Chicago, Ill.	10	Apache (near).
<b>Johnson County:</b>		
Bromide Crushed Rock Co.	15	Bromide.
<b>Kay County:</b>		
United States Indian School	1	Chilocco.
Michael Herber	3	Ponca City.
Geo. Wittmer	3	Do.
<b>Murray County:</b>		
Continental Asphalt & Petroleum Co., Oklahoma City, Okla.	13	Dougherty.
	13	Sulphur.
<b>Osage County:</b>		
Midland Valley Railway Co.	4	Avant.
<b>Payne County:</b>		
J. S. Vance, Parsons, Kans.	7	Cushing.
<b>Pontotoc County:</b>		
Oklahoma Portland Cement Co., Ideal Building, Denver, Colo.	14	Ada.
<b>Tulsa County:</b>		
Hughes Stone Co., Box 611, Tulsa, Okla.	5	Tulsa.
Quality Stone Co., Tulsa, Okla.	5	Sand Springs.
Tulsa Stone Co., Box 1351, Tulsa, Okla.	5	Tulsa.
Standard Paving Co.	5	Do.
<b>Washington County:</b>		
Dewey Portland Cement Co., 409 Scarritt Building, Kansas City, Mo.	2	Dewey.

*Gypsum operators in Oklahoma*

Company	Map reference No., Plate X	Mine at—
Blaine County: Oklahoma Portland Cement Co., 507 Ideal Building, Denver, Colo.	8	Ideal.
United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.	8	Southard.
Caddo County: Certain-teed Products Corporation, 100 East Forty-second Street, New York City.	11	Cement.
Grady County: Certain-teed Products Corporation, 100 East Forty-second Street, New York City.	11	Do.
Grady County: Certain-teed Products Corporation, 100 East Forty-second Street, New York City.	12	Acme.
Jackson County: United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.	9	Eldorado.

*Limestone operators in Arkansas*

Company	Map reference No., Plate X	Quarry at—
Benton County: Rogers White Lime Co.....	19	Monte Ne.
Hot Springs County: Jno. W. Fox, El Reno, Okla.....	24	Butterfield.
Independence County: Pfeiffer Stone Co., St. Joseph, Mo.....	23	Pfeiffer.
Izard County: Arkansas Lime Co.....	21	Ruddells.
Searcy County: Moss-DeVoy Lime & Stone Co., Memphis, Tenn.	20	St. Joe.
Sharp County: Greenville Stone & Gravel Co. (Inc.), 259 Walnut Street, Memphis, Tenn.	22	Williford.
Washington County: Ozark White Lime Co., Fayetteville, Ark....	{ 18 18	{ Johnson. Gulley.

*Gypsum operators in Arkansas*

Company	Map reference No., Plate X	Mine at—
Pike County: National Gypsum Co., 716 Commerce Trust Building, Kansas City, Mo.	25	Murfreesboro (under construction 1924).

**EASTERN KANSAS, MISSOURI, AND IOWA****KANSAS**

The Kansas limestone industry is confined almost exclusively to the eastern counties, and the quarries are located favorably to serve the coal mines, which are likewise in the east. Quite a number of quarries scattered throughout the southeastern counties are easily accessible to the Pittsburg coal field, with excellent railroad facilities. The principal quarries in this group are situated at Parsons, Labette County; Independence, Montgomery County; Chanute, Neosho County; Iola, Allen County; and at Bronson, Uniontown, Garland, and Fort Scott, Bourbon County. A quarry near Carthage, Jasper County, Mo., is equally available to the Pittsburg coal field. Other more distant sources are at Moline, Elk County, on the Atchison, Topeka & Santa Fe Ry.; at Winfield, Cowley County, served by several railway lines; at Eldorado, Butler County, on the Missouri Pacific R. R.; and at Florence, Marion County, on the Atchison, Topeka & Santa Fe Ry.

The nearest quarries to the Osage coal field are at Helmic, Morris County; Junction City, Geary County; Manhattan, Riley County; St. Marys, Pottawatomie County; Topeka, Shawnee County; Lawrence, Douglas County; and Ottawa, Franklin County. A network of railway lines permits easy access from any of these quarries.

For the Leavenworth coal field abundant supplies are available from many quarries in Wyandotte County in and about Kansas City, from Lawrence in Douglas County, or from Olathe in Johnson County. Other sources available are north at Atchison, Atchison County; Hiawatha, Brown County; and at Frankfort and Marysville, Marshall County. The quarries mentioned in connection with each coal field are not necessarily restricted to these immediate districts. The extensive supplies in the Kansas City region might be marketed as far south as the Pittsburg coal field in the southeastern corner of the State.

Gypsum supplies for the Leavenworth and Osage coal fields are obtainable at Blue Rapids, Marshall County. Gypsum mines at Sun City, Barber County, on the Atchison, Topeka & Santa Fe Ry. constitute possible sources of supply for the Pittsburg coal fields.

**MISSOURI**

The Pittsburg coal district, which is partly in Missouri though largely in Kansas, finds many sources of limestone supply in southeastern Kansas, but quarries in at least five places in southwestern Missouri might also be utilized: These are at Carthage, Jasper County; Neosho, Newton County; Pierce City, Lawrence County; Phenix and Springfield, Greene County. Railway lines are favorably situated for transportation from all these quarries.



The coal fields of Bates County would be supplied most readily from the quarries near Fort Scott, Kans., but quarries at West Line, Cass County, on the Missouri, Kansas and Texas Ry. could also ship to this district via Harrisonville. The Lewis Jordan coal fields might also find supplies at West Line, or might seek dusting materials eastward at Blackwater, Sweeney, or Booneville, Cooper County.

A quarry at Corder, Lafayette County, is within the area comprising the Lexington coal field. This important coal district has other adjacent sources of supply at South Liberty, Clay County; Parkville, Platte County; and the many quarries in and about Kansas City in Jackson County. More distant, though easily accessible, sources are to be found at St. Joseph, Buchanan County; Savannah, Andrew County; and Oregon, Holt County.

Quarries at Columbia are within the coal district of Boone County; likewise a quarry at Fulton is very near the coal mines of Callaway County. These quarries, with those of Cooper County and a quarry at Osage City in Cole County, might also supply the Bevier and Vandalia coal fields, though other supplies are available in quarries near Shelbyville, Shelby County; Hannibal and White Bear, Marion County; Louisiana, Pike County; Elsberry, Lincoln County; Weldon Spring, St. Charles County; and the many quarries in and about St. Louis. The St. Louis County quarries provide a very important source of supply for the extensive coal fields of western Illinois. The same is true of quarries further south along the Mississippi River at Barnhart, Jefferson County; Brickeys and Ste. Genevieve, Ste. Genevieve County; Cape Girardeau and Neelys Landing, Cape Girardeau County; and Ancell, Scott County; though the quarries south of St. Louis County may be handicapped to some extent by the difficulty of cross-river transportation.

The Mercer County coal mines could be most readily supplied from a limestone quarry at Bethany in Harrison County on the Chicago, Burlington, & Quincy R. R.

No limestone quarries are near the Marceline, Novinger, or Mendota coal fields, but supplies could be readily shipped from quarries along the Mississippi River to the east, or along the Missouri River to the west. A gypsum mine at Centerville, Appanoose County, Iowa, is well situated to supply dusting material to any northern Missouri coal mines.

#### IOWA

The Iowa coal fields are mainly in the central part, but the limestone industries are chiefly in the eastern part of the State. A few quarries, however, are near the coal mines. A quarry near Sigourney, Keokuk County, could supply the Albia coal field via either the Chicago, Rock Island & Pacific Ry. or the Chicago, Milwaukee & St. Paul Ry. A quarry at Peru, Madison County, on the Chicago,

Great Western R. R. is convenient to the Des Moines coal fields. A quarry at Marshalltown, Marshall County, could ship over the Chicago Great Western R. R. to the Des Moines field or over the Chicago & North Western Ry. to the Boone coal field. A quarry at Fort Dodge, Webster County, is very near the Coalville mines; quarries at Alden, Hardin County, and at Gilmore City, Pocahontas County, are within easy reach. More distant sources of supply for the Coalville coal fields are at Mason City, Cerro Gordo County, and at Osage, Mitchell County.

As indicated in Plate XI, there are many quarries in the eastern counties of Iowa; practically all of these have excellent railroad facilities to the leading coal-mining districts.

Gypsum mines are well situated to supply dusting material to the coal mines of Iowa. Several important gypsum mines near Fort Dodge, Webster County, are near the Coalville coal fields, and the Minneapolis & St. Louis Ry. leads south directly to the Boone and Des Moines coal fields. A gypsum mine at Centerville, Appanoose County, is near the mines of the Appanoose coal field and the Iowa Southern Utilities Ry. leads directly north to the Albia coal field. Thus gypsum mines are located at the northern and southern extremities of the Iowa coal fields and have excellent intermediate railroad facilities.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned, which reported to the United States Geological Survey as active in 1922, including a few companies not so reporting, but whose activity has been indicated from other sources, is given below. The numbers refer to the locations of the quarries as shown in Plate XI. When the office and quarry are in different localities the office address is given after the company name. The companies are given by States and by counties, which are arranged alphabetically.

#### *Limestone operators in Kansas*

Company	Map reference No., Plate XI	Quarry at—
Allen County:		
Fry Bros. Contracting Co.....	84	Iola.
Atchison County:		
G. W. Kerford Quarry Co.....	70	Atchison.
Richard M. Vest.....	70	Do.
Bourbon County:		
Fry Bros. Contracting Co., Iola, Kans.....	85	Bronson.
Bourbon County Commissioners, Fort Scott, Kans. {	86	Uniontown.
	87	Garland.
	87	Fort Scott.
Fort Scott Hydraulic Cement Co.....	87	Do.
Thogmartin & Gardiner.....	87	Do.

*Limestone operators in Kansas—Continued*

Company	Map refer- ence No., Plate XI	Quarry at—
Brown County: Walnut Creek Quarry, Whaley, Sutley & Barnum, proprietors.	69	Hiawatha.
Butler County: Dolese Bros. Co., 337 West Madison Street, Chicago, Ill.	83	Eldorado.
Cowley County: J. F. Snodgrass.....	92	Winfield.
Winfield Stone Co.....	92	Do.
Douglas County: J. W. Jenkins & Son.....	76	Lawrence.
Elk County: The Solvay Process Co., Hutchinson, Kans..	91	Moline.
Franklin County: Bert Ross.....	80	Ottawa, R. F. D. No. 7.
Geary County: Ziegler & Dalton Construction Co.....	78	Junction City.
Johnson County: J. H. Cosgrove & Son.....	81	Olathe.
M. O. Milhoan.....	81	Do.
Labette County: J. M. Hardman Estate.....	89	Parsons.
Marion County: E. P. Jones.....	82	Florence.
Marshall County: Jno. F. Cass.....	68	Frankfort.
St. Joseph & Grand Island Railway Co., Fifteenth and Dodge Streets, Omaha, Nebr.	66	Marysville.
Montgomery County: Atlas Portland Cement Co.....	90	Independence.
Morris County: J. H. Smart, Council Gove, Kans.....	79	Helmic.
Neosho County: J. F. Byers, 1701 West Main Street, Chanute, Kans.	88	Chanute.
Pottawatomie County: Jno. C. Johnson.....	72	St. Marys.
Riley County: Almgren Limestone Works, 1413 Pierre Street, Manhattan, Kans.	71	Manhattan.
Shawnee County: Vigneron & Saut, 1020 Lawrence Street, Topeka, Kans.	77	Topeka.
Wyandotte County: D. H. Burton.....	74	Argentine.
I. L. Maxon.....	74	Do.
W. W. Monroe, R. F. D. No. 3, Kansas City, Kans.	74	Quindaro.
Norton Rock Co., Twenty-seventh and Bell Streets, Kansas City, Mo.	74	Kansas City.
Union Pacific R. R. Co., R. L. Huntley, General Manager, Omaha, Nebr.	75	Loring.
Harrison Moss.....	74	Kansas City, R. F. D. No. 3.
John Knight.....	74	Do.

*Limestone operators in Kansas—Continued*

Company	Map reference No., Plate XI	Quarry at—
<b>Wyandotte County—Continued.</b>		
John Young Turner, R. F. D. No. 3, Kansas City, Kans.	74	Quindaro.
John Ellis.....	74	Do.
Chas. Rickets.....	74	Do.
Fred Granger, 412 Walker Street, Kansas City, Kans.	74	Kansas City.
Tilley Dennis, Thirty-seventh and Westport Streets, Rosedale, Kans.	74	Rosedale.
Jennings & Son Quarry & Crusher Co., 3700 Rainbow Boulevard, Rosedale, Kans.	74	Do.
American Rock Crusher Co., 3600 Rainbow Boulevard, Rosedale, Kans.	74	Morris.
H. B. Thompson Co., Turner, Kans.....	74	Do.

*Gypsum operators in Kansas*

Company	Map reference No., Plate XI	Mine at—
<b>Barber County:</b>		
Best Bros. Keenes Cement Co., Medicine Lodge, Kans.	93	Sun City.
<b>Marshall County:</b>		
Beaver Products Co., Inc., American Cement Plaster Division, Buffalo, N. Y.	67	Blue Rapids.
U. S. Gypsum Co., 205 West Monroe Street, Chicago, Ill.	67	Do.

*Limestone operators in Missouri*

Company	Map reference No., Plate XI	Quarry at—
<b>Andrew County:</b>		
St. Joseph Quarries Co.....	31	Savannah.
<b>Boone County:</b>		
J. N. Fellows.....	38	Columbia.
Spencer-Whitlow Co.....	38	Do.
A. N. Spencer.....	38	Do.
<b>Buchanan County:</b>		
Reinert Bros. Construction Co., Inc., 1208 North Fifth Street, St. Joseph, Mo.	32	St. Joseph.
Buchanan County Quarry Co.....	32	Do.
Metropolitan Paving Co., 114 North Fifth Street, St. Joseph, Mo.	32	Do.
Pfeiffer Stone Co.....	32	Do.



*Limestone operators in Missouri—Continued*

Company	Map refer- ence No., Plate XI	Quarry at—
<b>Jackson County—Continued.</b>		
H. J. Nicholas Crusher Co., Thirty-third and Roanoke Streets, Kansas City, Mo.	43	Kansas City. Do.
M. F. Sullivan, 3314 Jefferson Street, Kansas City, Mo.	43	Do.
Swenson Construction Co., Second floor, Shubert Theater Building, Kansas City, Mo.	43	Do.
Kansas City Quarries Co., 1016 Baltimore Avenue, Kansas City, Mo.	43	Do.
<b>Jasper County:</b>		
Carthage Marble & Building Stone Co.-----	64	Carthage.
Webb City Stone Co., Webb City, Mo.-----	64	Carterville.
F. W. Steadley Co.-----	64	Carthage.
Carthage Crushed Limestone Co.-----	64	Do.
Consolidated Marble & Stone Co.-----	64	Do.
The Ozark Quarries Co.-----	64	Do.
Independent Gravel Co.-----	64	Do.
<b>Jefferson County:</b>		
Peter McLoon & Co., Pevely, Mo.-----	55	Barnhart
Glencoe Lime & Cement Co., 901 Syndicate Trust Building, St. Louis, Mo.	55	Do.
<b>Lafayette County:</b>		
Diamond Coal Co.-----	41	Corder.
<b>Lawrence County:</b>		
Pierce City Lime Co.-----	63	Pierce City.
<b>Lincoln County:</b>		
Crystal Carbonate Lime Co., Louisiana, Mo.	36	Elsberry.
<b>Marion County:</b>		
Bluff City Lime & Stone Co., 201 West Third Street, Alton, Ill.	34	Hannibal.
Marble Head Lime Co., 159 North State Street, Chicago, Ill.	34	White Bear.
<b>Newton County:</b>		
T. C. Hatler-----	65	Neosho.
<b>Pike County:</b>		
Marble Head Lime Co., 159 North State Street, Chicago, Ill.	45	Louisiana.
<b>Platte County:</b>		
United States Engineers Office, 707 Postal Telegraph Building, Kansas City, Mo.	73	Parkville.
<b>St. Charles County:</b>		
Weldon Spring Quarry Co.-----	48	Weldon Spring.
<b>Ste. Genevieve County:</b>		
St. Louis Lime & Cement Co., 4025 Park Avenue, St. Louis, Mo.	56	Brickeys.
Clifdale Quarry & Manufacturing Co.-----	56	Do.
Arrowhead Manufacturing Co., 4025 Park Avenue, St. Louis, Mo.	56	Do.
Arnold Stone Co., Neelys Landing-----	57	Ste. Genevieve.
Peerless White Lime Co., 904 Century Building, St. Louis, Mo.	57	Mosher.
Ste. Genevieve Lime & Quarry Co., 926 Boatman's Bank Building, St. Louis, Mo.	57	Ste. Genevieve.
McLoon Ste. Genevieve Limestone Co.-----	57	Do.
Western Lime Works, 926 Boatmen's Bank Building, St. Louis, Mo.	57	Do.

*Limestone operators in Missouri—Continued*

Company	Map reference No., Plate XI	Quarry at—
<b>St. Louis County:</b>		
Florissant Construction Real Estate Investment Co., 3869 Park Street, St. Louis, Mo.	52	Brentwood.
Geo. H. Knoche, R. F. D. No. 27, Creve Coeur, Mo.	51	Fern Ridge.
John C. Heins-----	49	Florissant, R. F. D. No. 35.
New Jamestown Quarry Co., R. F. D. No. 34, Florissant.	50	Spanish Lake.
Henry E. Heintz-----	54	Jefferson Barracks, R. F. D. No. 10.
Wm. & F. Ruprecht C. & I. Co., 8011 South Broadway, St. Louis, Mo.	52	St. Louis.
Emile Steffen & Bros-----	54	Nursery.
Albert Bussen, R. F. D. No. 9, Jefferson Barracks, Mo.	54	Quarantine.
Jas. F. Rothwell, 731 North Euclid Avenue, St. Louis, Mo.	51	Vigus.
Sinclair Quarry & Construction Co., 212 Wainright Building, St. Louis, Mo.	51	Do.
Lamb Construction Co., 875 Sixty-sixth Street, St. Louis, Mo.	52	University City.
Centaur Lime Co-----	53	Centaur Station.
Glencoe Lime & Cement Co., 901 Syndicate Trust Building, St. Louis, Mo.	53	Glencoe.
<b>St. Louis City:</b>		
Bambrick Bros. Construction Co., 5229 St. Louis Avenue, St. Louis, Mo.	52	St. Louis.
Big Bend Quarry Co., 806 Security Building, St. Louis, Mo.	52	Maplewood.
T. E. Cavanaugh, 6509 Manchester Avenue, St. Louis, Mo.	52	St. Louis.
Evermann Construction Co., 1210 South Grand Avenue, St. Louis, Mo.	52	Do.
Fehlig Construction Co., 3500 Hickory Street, St. Louis, Mo.	52	Do.
Hoffman Bros. Construction Co., 2712 Wyandotte Street, St. Louis, Mo.	52	Do.
Independent Quarry Construction Co., 4875 Ashland Avenue, St. Louis, Mo.	52	Do.
St. Louis Workhouse Quarry, 4200 South Broadway, St. Louis, Mo.	52	Do.
Tower Grove Quarry & Construction Co., 5927 Tyler Avenue, St. Louis, Mo.	52	Do.
Union Quarry & Construction Co., Room 806, 319 North Fourth Street, St. Louis, Mo.	52	Do.
Progress Press Brick & Machine Co-----	52	Do.
<b>Scott County:</b>		
Tri-City Stone Co-----	60	Ancell.
<b>Shelby County:</b>		
Shelby Farmers' Cooperation Limestone Co--	33	Shelbyville.

*Limestone operators in Iowa*

Company	Map refer- ence No., Plate XI	Quarry at—
Allamakee County:		
Wilkes Williams.....	4	Postville, R. F. D. No. 1.
Geo. Holtzmanner, La Crosse, Wis.....	2	Heytmans.
Blackhawk County:		
Hawkeye Quarries Co., Cedar Rapids, Iowa.....	10A	Laporte City.
A. Bartlett, 1165 East Fourth Street, Water- loo, Iowa.	10	Waterloo.
Waterloo Quarry Co.....	10	Do.
Cerro Gordo County:		
Henry Kuppinger.....	3	Mason City.
Quinby Stone Co., 24 Thirteenth Street Northeast, Mason City, Iowa.	3	Do.
Clayton County:		
Marquette Stone Products Co.....	5	McGregor.
Clinton County:		
C. T. Hanrahan.....	18	Charlotte.
Harvey Seidle, 431 Elm Street, Clinton, Iowa.	19	Clinton.
Des Moines County:		
W. J. Welsh.....	26	Burlington.
Dubuque County:		
Wm. Becker, 1333 Kaufman Avenue, Du- buque, Iowa.	12	Dubuque.
Eagle Point Lime Works.....	12	Do.
Thos. R. Welsh, 202 West Locust Street, Dubuque, Iowa.	12	Do.
B. N. Arquitt.....	11	Farley.
Hardin County:		
Hale Roberts Stone Co.....	9	Alden.
Jackson County:		
A. A. Hurst, Maquoketa, Iowa.....	13	Hurstville.
Johnson County:		
River Products Co., Iowa City, Iowa.....	22	Coralville.
Jones County:		
Hawkeye Quarries Co., Cedar Rapids, Iowa.....	14	Stone City.
The Reformatory, Anamosa, Iowa.....	14	Do.
H. Dearborn's Sons.....	14	Do.
Keokuk County:		
Russell B. Royce.....	23	Sigourney (near).
Lee County:		
McManus Quarries Co., Inc., Box 93, Keo- kuk, Iowa.	27	Ballinger.
Keokuk Quarry & Construction Co., 1325 Main Street, Keokuk, Iowa.	28	Keokuk.
Burlington Quarry Co., 17 South Seventh Street, Keokuk, Iowa.	27	Montrose.
Linn County:		
Ellis Park Stone Co.....	16	Cedar Rapids.
J. E. Colton.....	17	Mount Vernon.
Madison County:		
Peru Stone & Cement Co., 308 West Fifth Street, Des Moines, Iowa.	24	Peru.
Marshall County:		
County Engineer, Marshall County.....	15	Marshalltown.
Mitchell County:		
Belzer & Branden.....	1	Osage.
Osage Stone Co.....	1	Do.



*Limestone operators in Iowa—Continued*

Company	Map reference No., Plate XI	Quarry at—
Pocahontas County: Portland Cement Corporation, Gilmore City, Iowa.	6	Gilmore City.
Scott County: Otto Thompson, Bettendorf Stone Co., 820 Kirkwood Boulevard, Davenport, Iowa.	20	Bettendorf.
Dolse Bros. Co., 337 West Madison Street, Chicago, Ill.	21	Buffalo.
Linwood Stone & Cement Co., 713 Kahl Building, Davenport, Iowa.	21	Linwood.
Webster County: Fowler & Pay-----	8	Fort Dodge.

*Gypsum operators in Iowa*

Company	Map reference No., Plate XI	Mine at—
Appanoose County: Centerville Gypsum Co., Box 258, Centerville, Iowa.	25	Centerville.
Webster County: Beaver Products Co., Inc., American Cement Plaster Division, Buffalo, N. Y.	7	Fort Dodge.
Certain-teed Products Corp., 100 East Forty-second Street, New York City.	7	Do.
Cardiff Gypsum Co., 903 Central Avenue, Fort Dodge, Iowa.	7	Do.
Plymouth Gypsum Co-----	7	Do.
Universal Gypsum Co-----	7	Do.
United States Gypsum Co., 205 West Monroe Street, Chicago, Ill.	7	Do.
Wasem Plaster Co., Snell Building, Fort Dodge, Iowa.	7	Do.

**NEW MEXICO**

Both limestone and gypsum are available for coal-mine dusting in New Mexico. The most favorably located limestone quarries for the Gallup field are at Bluewater in northern Valencia County on the Atchison, Topeka & Santa Fe Ry. Quarries near Albuquerque, East Las Vegas, and Santa Fe on the same railway are also within reach. The latter quarries are also convenient to the Raton coal field, Colfax County. The coal mines of Santa Fe County might be supplied from quarries at Albuquerque, Santa Fe, or Las Vegas. Coal mines in Socorro County could obtain supplies from quarries near Albuquerque over the Atchison, Topeka & Santa Fe Ry., and the mines of Lincoln County might find a very convenient source of stone from a quarry at Gallinas, a few miles north on the El Paso & Southwestern R. R. The mines of San Juan County are afforded a convenient source of

supply from a limestone quarry at Kirtland near Farmington. The mines in the north of Rio Arriba County could be most easily supplied from quarries in and near Durango, Colo., as direct connection is provided over the Denver & Rio Grande Western R. R.

Gypsum mines are located at Carlsbad, Eddy County, and at Acme, Chaves County. Shipment could be made to the Gallup field via Clovis on the Atchison, Topeka & Santa Fe Ry., and to the Raton field by a somewhat less direct route.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned is given below. As quarries are few, all companies that have reported activity within recent years are included. The numbers refer to the location of the quarries as shown in Plate XII. When the office and quarry are in different locations the office address is given after the company name. The companies are given by counties, which are alphabetically arranged.

#### *Limestone quarry operators in New Mexico*

Company	Map reference No., Plate XII	Quarry at—
Bernalillo County: Eureka White Lime Co.....	5	Albuquerque.
Lincoln County: El Paso & Southwestern Railroad Co., El Paso, Tex.	6	Gallina.
San Juan County: Meadows Lime Kiln, Edmund Thurland.....	1	Kirtland.
San Miguel County: The Canyon Lime Co., J. H. Stearns, President, East Las Vegas, N. Mex.	3	Hot Springs.
Santa Fe County: Milo Hill & Co., 133 Hillside Avenue, Santa Fe, N. Mex.	2	Santa Fe.
The New Mexico Penitentiary.....	2	Do.
Valentia County: Eureka White Lime Co., Albuquerque, N. Mex.	4	Bluewater.
Bluewater Commercial Co.....	4	Do.
L. W. Lewis Sons, Emporia, Kans.....	4	Do.

#### *Gypsum operators in New Mexico*

Company	Map reference No., Plate XII	Mine at—
Chaves County: Certain-teed Products Corp., 100 East Forty-second Street, New York, N. Y.	7	Acme.
Eddy County: Globe Plaster & Mining Co., 222 Commerce Building, Kansas City, Mo.	8	Carlsbad.

## COLORADO, UTAH, AND SOUTHERN WYOMING

Many limestone quarries and gypsum mines are available to the coal districts of Colorado, Utah, and southern Wyoming. As active limestone quarries are not as numerous as in most of the eastern coal-producing States, quarries that have shown any indication of activity during recent years are mapped and listed even though they may not have reported activity to the United States Geological Survey for 1922 or 1923. As the coal fields, limestone quarries, and gypsum mines of southern Wyoming are intimately related to those of northern Utah and Colorado, southern Wyoming is included in the Utah-Colorado map.

## COLORADO

For the Durango coal field a limestone quarry at Durango is close to the mines, and one at Rockwood is a few miles north on the Denver & Rio Grande Western R. R. A supply might also be obtained from a quarry at Kirkland in San Juan County, N. Mex.

No quarries are reported in the immediate neighborhood of the Walsenburg-Trinidad district, but limestone and gypsum are available in quantity within easy shipping distance to the north and west. A quarry near Creede, Mineral County, is available for direct shipment via the Denver & Rio Grande Western R. R. to Walsenburg. Shipment could also be made southward via the same railroad to these coal mines from limestone quarries or gypsum mines in Pueblo, Fremont, Teller, and El Paso Counties.

The Canon City coal district is well situated, as limestone quarries are within a radius of a few miles at Stone City and Pueblo, Pueblo County, to the east; at Wellsville, Canon City, and Calcite to the west; at Cripple Creek in Teller County, and near Manitou and Pikeview in El Paso County to the north. The last named quarries are also convenient to the coal mines near Colorado Springs. Quarries at Salida and Monarch on the Denver & Rio Grande Western R. R. in Chaffee County, although farther distant, have direct rail connection. Gypsum mines at Stone City, Pueblo County, and at Coaldale, Fremont County, are also within easy shipping distance.

The Gunnison coal district would be served most readily by limestone quarries or gypsum mines in Chaffee and Fremont Counties. The coal mines in and about Somerset in northwest Gunnison County are connected most directly by rail with the limestone quarries of La Plata County. The same quarries might supply the mines in and near Grand Junction, Mesa County, although quarries at Glenwood Springs are less distant. The quarries at Glenwood Springs constitute a convenient source of supply for the mines of eastern Garfield County.

A limestone quarry is closely associated with the coal mines near Morrison, Jefferson County. For the coal fields north of Denver

a large gypsum mine at Loveland, Larimer County, is very convenient over either the Colorado & Southern Ry. or the Great Western Ry. Limestone is also available from quarries at Laporte, Ingleside, or Fort Collins in the same county with rail service via the Colorado & Southern Ry. or Union Pacific R. R.

A quarry at Steamboat Springs, Routt County, is easily available to the Routt district. The mines at Coalmont, Jackson County, have no immediate source of supply but shipment could easily be made from a gypsum mine or a limestone quarry at Laramie in southern Wyoming by way of the Colorado, Wyoming & Eastern Ry.

#### UTAH

An isolated coal-mining region near Cedar City in southern Iron County is fortunate in having limestone quarries and a gypsum mine in its immediate neighborhood.

Neither limestone quarries nor gypsum mines are located near the coal mines of central Grand County. If local deposits are not available for development, shipment must be made from central Utah or from Glenwood Springs, Colo. The Castle Dale coal mines of Emery County are without rail facilities, therefore an effort should be made to locate and develop suitable dusting materials near the mines.

If a supply of mineral dust for the important Hiawatha, Sunnyside, Castlegate, and Pleasant Valley coal districts is to be obtained from operating mines or quarries, shipment must be made via the Denver & Rio Grande Western R. R. from central Utah where many gypsum mines and limestone quarries are available. Several gypsum mines are located at Sigurd, Sevier County, on the Denver & Rio Grande Western R. R., from which shipment could be made north to Thistle and thence east on the main line. Gypsum could also be obtained from mines at Gypsum near Nephi in Juab County over a less direct route. Limestone could be obtained from a quarry at Ephraim, Sanpete County, over the Denver & Rio Grande Western R. R., via Thistle, also from numerous quarries in Utah, Juab, and Tooele Counties on either the Denver & Rio Grande Western R. R. or the Logan & Southern Ry. The locations of the quarries are given in the list of operators.

The absence of active quarries in Carbon County encourages the development of limestone deposits near the coal mines. The United States Geological Survey reports an outcrop of high-grade limestone of the Green River formation along the railroad between Jennings and Colton in southeastern Utah County. This deposit, which is shown on the map, is advantageously situated for the Castlegate and the Pleasant Valley coal districts.

The nearest active source of supply for the mines at Vernal in central Uinta County is a gypsum mine at Roosevelt, Duchesne County. No rail connection is available, and the difficulty of traversing the

intervening mountainous country might make development of local supplies desirable.

The quarry that is most convenient to the mines at Coalville is at Devil's Slide, Morgan County, on the Union Pacific Ry. Quarries at Ogden are available over the same railway line, and a quarry at Lakeside in Box Elder County on the Southern Pacific R. R. is a possible source. Quarries at Logan, Providence, and Smithfield in Cache County could make shipment over the Oregon Short Line Ry. via Ogden. Limestone supplies could also be sent to Coalville from the south from quarries near Salt Lake and Burmester.

SOUTHERN WYOMING

The Evanston coal field in Uinta County could be most conveniently supplied with limestone from the quarries at Devil's Slide and Ogden, Utah, via the Union Pacific Ry. A quarry at Orr near Sage in southern Lincoln County is conveniently situated to serve the Kemmerer coal field over the Oregon Short Line Ry. and by shipping further east over the Union Pacific R. R. to supply the Rock Springs coal mines. The Rock Springs mines could also obtain limestone from quarries at Rawlins in Carbon County. The Hanna coal district could obtain limestone at Rawlins, limestone and gypsum at Laramie in Albany County, and limestone at Granite Canyon, Horse Creek, and Altus in Laramie County. The last named county could also ship south into Utah.

LOCATION OF COMPANIES

A list of the companies at the locations mentioned is given below. All names of companies that have been active during recent years are included. The numbers refer to the locations of the quarries as shown in Plate XIII. Where the office and quarry are in different locations the office address is given after the company name. The lists are arranged by States and by counties, which are arranged alphabetically.

*Limestone operators in Colorado*

Company	Map reference No., Plate XIII	Quarry at —
<b>Chaffee County:</b>		
Tomlin & Beck, Garfield, Colo.-----	42	Salida.
Watson & Davis, Garfield, Colo.-----	43	Monarch.
Giant-Eclipse Ore & Lime Trust, Box 833, Denver, Colo.	42	Salida.
Earl Beck-----	43	Garfield.
<b>El Paso County:</b>		
The Western Lime Co., 305 Sugar Building, Denver, Colo.	40	Manitou.
Holly Sugar Corporation, Box 118, Denver, Colo.	39	Pikeview.

*Limestone operators in Colorado—Continued*

Company	Map reference No., Plate XIII	Quarry at—
<b>Fremont County:</b>		
S. Vernon St. John .....	44	Canon City.
Colorado Fuel & Iron Co., 803 Boston Building, Denver, Colo. ....	45	Calcite.
Colorado State Penitentiary .....	44	Canon City.
Diamond Fire Brick Co. ....	44	Do.
Nigro & Post, Salida, Colo. ....	45	Do.
Colorado Lime Corporation, 203 Empire Building, Denver, Colo. ....	45	Wellsville.
Colorado Marble & Stone Co., 740 Washington Street, Denver, Colo. ....	45	Calcite.
<b>Garfield County:</b>		
Holly Sugar Corporation, Box 118, Denver, Colo. ....	37	Wellsville.
<b>Jefferson County:</b>		
Morrison Stone Lime & Fluxing Co., 321 McFee Building, Denver, Colo. ....	38	Glenwood Springs.
<b>La Plata County:</b>		
John F. Bell .....	51	Morrison.
The Farmers Supply Co. ....	52	Rockwood.
<b>Larimer County:</b>		
Owl Canon Quarry Co. ....	34	Durango.
Fort Collins Limestone Co. ....	34	Laporte.
Charles E. Roberts .....	34	Do.
Josefson Bros., Laporte, Colo. ....	34	Do.
John Levandowski .....	34	Fort Collins.
Ingleside Limestone Co., 500 Sugar Building, Denver, Colo. ....	33	Laporte.
<b>Mineral County:</b>		
L. G. Carpenter .....	50	Ingleside.
<b>Pueblo County:</b>		
Turkey Creek Stone Clay & Gypsum Co., 302 Central Block, Pueblo, Colo. ....	48	Creede.
Ormon Crushed Stone Co. ....	49	Stone City.
<b>Routt County:</b>		
Volcano Limestone & Mining Co. ....	35	Pueblo.
<b>Teller County:</b>		
United Gold Mines Co. ....	41	Steamboat Springs.
Portland Gold Mining Co., Mining Exchange Building, Colorado Springs, Colo. ....	41	Cripple Creek.
		Do.

*Gypsum operators in Colorado*

Company	Map reference No., Plate XIII	Mine at—
<b>Fremont County:</b>		
Colorado Portland Cement Co., 507 Ideal Building, Denver, Colo. ....	46	Coaldale.
<b>Larimer County:</b>		
United States Gypsum Co., Denver, Colo. ....	36	Loveland.
<b>Pueblo County:</b>		
Turkey Creek Stone Clay & Gypsum Co., 304 Central Block, Pueblo, Colo. ....	47	Stone City.

*Limestone operators in Utah*

Company	Map reference No., Plate XIII	Quarry at —
<b>Beaver County:</b>		
Willard S. Thompson & Son.....	23	Beaver.
<b>Box Elder County:</b>		
Southern Pacific Co., 65 Market Street, San Francisco, Calif.	4	Lakeside.
<b>Cache County:</b>		
Cache Valley Lime Co., Chas. E. Peterson, 617 North First Street East, Logan, Utah.	2	Logan.
Jacob P. Peterson Lime Co., 6 North First Street East, Logan, Utah.	2	Do.
Logan Lime Kiln Co., 218 East Fifth Street North, Logan, Utah.	2	Do.
The Amalgamated Sugar Co., David Ecele Building, Ogden, Utah.	3	Providence.
Smithfield Brick & Tile Co.....	1	Smithfield.
<b>Iron County:</b>		
J. Raymond Coslett.....	25	Cedar City.
George A. Wood.....	25	Do.
John E. Dover & Sons.....	25	Do.
<b>Juab County:</b>		
J. F. Snell & B. H. Grant, Eureka, Utah....	16	Boulter.
Chief Consolidated Mining Co.....	17	Eureka.
<b>Millard County:</b>		
Mineral Paint Products Co., Box 334, Salt Lake City, Utah.	21	Jerome.
<b>Morgan County:</b>		
Union Portland Cement Co., Ogden, Utah....	6	Devils Slide.
<b>Salt Lake County:</b>		
Strange-Maguire Paving Co., 401 Utah Savings Trust Building, Salt Lake City, Utah.	7	Salt Lake City.
Langton Lime & Cement Co., 346 South Third Street West, Salt Lake City, Utah.	7	Do.
<b>Sanpete County:</b>		
Parry Bros. Stone Co., Manti, Utah.....	20	Ephraim.
Sanpete White Stone Co.....	20	Do.
Jacob Peterson.....	20	Do.
<b>Tooele County:</b>		
Moon & Munding, Benmore, Utah.....	14	Dunbar.
American Smelting & Refining Co., 120 Broadway, New York, N. Y.	11	Topliff.
United States Smelting, Refining & Manufacturing Co., lime quarry department, 916 Newhouse Building, Salt Lake City, Utah.	11	Do.
Utah Lime & Stone Co., 322 Ness Building, Salt Lake City, Utah.	8	Dolomite (near Burmester).
Utah-Idaho Sugar Co., Salt Lake City, Utah.	11	Topliff.
<b>Utah County:</b>		
L. E. Thomas.....	15	Goshen.
Florence Lime Co.....	13	Payson.
Giles & Peterson.....	12	Provo.
F. W. C. Hathenbruck, 243 East Fifth, North Provo, Utah.	12	Do.
Broadman's Lime Kiln.....	12	Do.
Undeveloped limestone deposit.....	18	Colton (near).
<b>Wasatch County:</b>		
The Amalgamated Sugar Co., Ogden, Utah....	9	Heber.
<b>Weber County:</b>		
Ogden Canyon Lime Co., 1230 Jefferson Avenue, Ogden, Utah.	5	Ogden.
Weber County Road Commission.....	5	Do.

*Gypsum operators in Utah*

Company	Map reference No., Plate XIII	Mine at—
Duchesne County: Timothy Hard Wall Co.-----	10	Roosevelt.
Iron County: Monmouth Plaster & Cement Co.-----	24	Cedar City.
Juab County: Nephi Plaster & Manufacturing Co., 322 Ness Building, Salt Lake City, Utah.	19	Gypsum.
Sevier County: Utah Natural Products Co. (Inc.), Salt Lake City, Utah.	22	Sigurd.
American Keene Cement Co., Salt Lake City, Utah.	22	Do.
Jumbo Plaster & Cement Co.-----	22	Do.

*Limestone operators in southern Wyoming*

Company	Map reference No., Plate XIII	Quarry at—
Albany County: University of Wyoming-----	29	Laramie.
Geo. W. Trabing-----	29	Do.
Carbon County: J. Buck-----	27	Rawlins.
H. Larsen-----	27	Do.
Laramie County: Ingleside Limestone Co., 500 Sugar Building, Denver, Colo.	{ 32 30 28	Granite Canyon. Horse Creek. Altus.
Lincoln County: Liberty Potash Co., Bankers Trust Co., Salt Lake City, Utah.	26	Orr.

*Gypsum operators in southern Wyoming*

Company	Map reference No., Plate XIII	Mine at—
Albany County: Certain-teed Products Corporation, 100 East Forty-second Street, New York, N. Y.	31	Laramie.
Laramie Cement Plaster Co.-----	31	Do.
Colorado Portland Cement Co., 507 Ideal Building, Denver, Colo.	31	Do.
Overland Cement Plaster Co., Box 636, Laramie, Wyo.	31	Do.



**NORTHERN WYOMING AND CENTRAL MONTANA**

As the limestone quarries of Wyoming and Montana are few, all those that have reported activity during recent years are mapped and listed even though they have not reported to the United States Geological Survey for 1922 or 1923. The gypsum mines listed are in active operation.

**NORTHERN WYOMING**

Limestone quarries at Lander, Fremont County, are convenient to the Hudson coal field, with direct rail connection via the Chicago & North Western Ry. The nearest limestone quarry to the coal mines of Converse County are at Guernsey, Platte County, on the Chicago, Burlington & Quincy R. R., and at Hartville north of Guernsey on the Colorado & Wyoming Ry. Both limestone and gypsum may be readily shipped from Greybull in Big Horn County to the Gebo coal field via the Chicago, Burlington & Quincy R. R. The limestone quarries and gypsum mine at Greybull also constitute a convenient source of dusting material for the Cody coal mines in Park County, Wyo., and the important Bridger and Red Lodge coal fields of southern Montana. The most easily accessible limestone quarry to the Sheridan coal field is at Newcastle in Weston County on the Chicago, Burlington & Quincy R. R. This quarry also constitutes a local supply for the Newcastle coal mines.

**CENTRAL MONTANA**

As noted in the preceding paragraph, the Bridger and Red Lodge coal fields could be most readily supplied from the limestone quarries and gypsum mine at Greybull, Wyo. Limestone might also be shipped from quarries at Livingston, Park County, over the Northern Pacific Ry. The Livingston quarries also provide a supply right at hand for the Trailcreek coal field. Similarly a quarry at Roundup, Musselshell County, is very near the Roundup coal field.

Gypsum supplies are right at hand for the coal mines near Lewistown, Fergus County, for large gypsum mines are at Hanover, a short distance northwest, and at Piper, a few miles southeast. These gypsum mines might also supply the coal mines of western Fergus County and those of Cascade County, as the Great Northern Ry. affords direct transportation.

A quarry at Albright, a few miles south of Armington, affords a supply of limestone for the Cascade County coal mines. Limestone quarries in Lewis and Clark, Deerlodge, Gallatin, Jefferson, and Powell Counties, as indicated on the map, might afford supplementary sources of supply for the Trailcreek or Cascade County coal mines.

## LOCATION OF COMPANIES

Lists of the limestone and gypsum companies at the locations mentioned are given below. The numbers refer to the locations of the quarries and mines as shown in Plate XIV. When the office and quarry or mine are in different locations the office address is given after the company name. The companies are given by States and by counties, which are alphabetically arranged.

*Limestone operators in northern Wyoming*

Company	Map reference No., Plate XIV	Quarry at—
Big Horn County:		
Ingleside Limestone Co., 500 Sugar Building, Denver, Colo.	14	Greybull.
Wyoming Sugar Co., Worland, Wyo.....	14	Do.
Wyoming Cement Plaster Co.....	14	Do.
Fremont County:		
Lander Lime Co.....	16	Lander.
J. P. McKenna.....	16	Do.
Platte County:		
Ingleside Limestone Co.....	18	Guernsey.
W. H. Vaughn.....	17	Hartville.
Kittrell & Fowler.....	18	Guernsey.
Do.....	18	Do.
Weston County:		
Weston County Quarry.....	15	Newcastle.

*Gypsum operators in northern Wyoming*

Company	Map reference No., Plate XIV	Mine at—
Big Horn County:		
Wyoming Cement Plaster Co.....	13	Greybull.

*Limestone operators in central Montana*

Company	Map reference No., Plate XIV	Quarry at—
Cascade County:		
Anaconda Copper Mining Co., Great Falls Reduction Department, Great Falls, Mont.	1	Albright.
Deer Lodge County:		
Anaconda Copper Mining Co., R. D. Cole, assistant secretary, 25 Broadway, New York, N. Y.	8	Anaconda.
Wm. Lorenz.....	8	Do.

*Limestone operators in central Montana—Continued*

Company	Map reference No., Plate XIV	Quarry at—
Gallatin County:		
Story Rock Co., Bozeman, Mont.-----	11	Logan.
Jefferson County:		
Boulder White Lime Co.-----	9	Boulder.
Schiaron Bros.-----	9	Do.
East Butte Copper Mining Co., Butte, Mont.	10	Cardwell.
American Smelting & Refining Co., 120	6	East Helena (near).
Broadway, New York, N. Y.		
Lewis and Clark County:		
Adami Bros., 314 South Park Avenue, Helena,	5	Helena.
Mont.		
Story & Rock Co., Bozeman, Mont.-----	5	Do.
Musselshell County:		
L. F. Lawler, Butte, Mont.-----	7	Roundup.
Park County:		
B. F. Carlisle.-----	12	Livingston.
County Commissioner.-----	12	Do.
Powell County:		
Elliston Lime Co., W. T. Kuehn, President,	4	Elliston.
Helena, Mont.		

*Gypsum operators in central Montana*

Company	Map reference No., Plate XIV	Mine at—
Fergus County:		
Northwest Gypsum Products Co., Lewiston,	3	Piper.
Mont.		
Three Forks Portland Cement Co., Butte,	2	Hanover.
Mont.		

**WASHINGTON**

Few limestone quarries are near the Washington coal mines. A quarry at McMillin, Pierce County, on the Northern Pacific Ry., is situated most conveniently. Excellent railway facilities are afforded for the Wilkeson-Carbonado and the King County coal fields. A group of quarries in San Juan County, situated at Deer Harbor, Friday Harbor, Roche Harbor, and Orcas Island, also a lime-plant quarry at Bellingham, Whatcom County, are available to water transportation. Therefore, their products might be brought to the coal fields at prices low enough to justify their use.

A lime-plant quarry at Sumas, Whatcom County, might ship directly south to the coal fields via the Northern Pacific Ry., or

might ship to Bellingham and from there by water. A quarry at Brewster, Okanogan County, is not far from the coal fields, but the railroad route is very indirect. A quarry at Langdon, Walla Walla County, might possibly ship to the Roslyn and King County coal fields. The McMillin quarry in Pierce County is evidently the nearest source of supply for the Ladd and Centralia coal fields.

Quarries in eastern Washington at Ione in Pend d'Oreille County, at Clayton, Evans, Northport, and Colville in Stevens County, and at Freeman, and Spear, in Spokane County, are possible sources, but may be too distant for profitable shipment.

No gypsum is mined in Washington, but the Pacific Coast Gypsum Co. operates a mill at Tacoma that uses gypsum mined in Alaska. As Tacoma is a point convenient for distribution to many coal mines, the Alaska gypsum might be used as a dusting material.

#### UNDEVELOPED DEPOSITS

As limestone quarries now in operation in the immediate vicinity of the coal mines of Washington are so few, to quarry undeveloped limestone deposits may be desirable in order to obtain the necessary dusting materials. The locations of possible deposits that might be so developed are shown on the map by stars. One of these deposits is a few miles north of Wenatchee in Chelan County. No analyses are available, but the stone is said to be of good quality. Limestone also occurs near Baring, King County. It is said to be of good quality, but the extent of the deposit is not known. A limestone deposit reported at Snoqualmie Pass is admirably located to serve the King County coal mines, but no information is available as to the quantity or quality of the limestone there.

#### LOCATION OF COMPANIES

A list of the companies at the locations mentioned is given below. As the number of operations in the State is limited all that have shown any activity in recent years are listed and mapped. The numbers refer to the location of the quarries as shown in Plate XV. When the office and quarry are in different locations the office address is given after the company name. The operators are listed by counties, which are alphabetically arranged.

*Limestone operators in Washington*

Company	Map reference No., Plate XV	Quarry at—
<b>Okanogan County:</b>		
Preston Hanley .....	10	Brewster.
<b>Pend Oreille County:</b>		
Bunker Hill Smelter, Kellogg, Idaho .....	14	Ione.
Raymond Allen .....	14	Do.
<b>Pierce County:</b>		
Tacoma Lime Products & Fertilizer Co., 206 Tacoma Building, Tacoma, Wash.	6	McMillin.
<b>San Juan County:</b>		
Henry Cowell Lime & Cement Co., 507 Railway Exchange Building, Portland, Oreg.	{ 4	Deer Harbor.
Orcas Lime Co., 332 Pioneer Building, Seattle, Wash.	{ 5	Friday Harbor.
	{ 4	Deer Harbor.
American Smelting & Refining Co., P. O. box 1605, Tacoma, Wash.	{ 5	Friday Harbor.
	{ 3	Orcas Island.
Tacoma & Roche Harbor Lime Co. ....	{ 4	Roche Harbor.
<b>Spokane County:</b>		
Washington Brick, Lime & Sewer Pipe Co., Spokane, Wash.	{ 8	Freeman.
	{ 9	Spears.
<b>Stevens County:</b>		
Washington Brick, Lime & Sewer Pipe Co., Spokane, Wash.	11	Clayton.
Idaho Lime Co., J. H. Evans, president, 1310 Ide Avenue, Spokane, Wash.	13	Evans.
Northport Smelting & Refining Co. ....	15	Northport.
Crown Willamette Paper Co., 248 Battery Street, San Francisco, Calif.	12	Colville (near).
<b>Walla Walla County:</b>		
American Smelting & Refining Co., Box 1605, Tacoma, Wash.	7	Langdon.
<b>Whatcom County:</b>		
International Lime Co. ....	1	Sumas.
Orcas Lime Co., 332 Pioneer Building, Seattle, Wash.	2	Bellingham.

*Gypsum operators in Washington*

Company	Map reference No., Plate XV	Mine at—
<b>Pierce County:</b>		
Pacific Coast Gypsum Co., 403 Perkins Building, Tacoma, Wash.	{-----	Mill at Tacoma.
	{-----	Mine in Alaska.

## PUBLICATIONS ON EXPLOSIBILITY OF COAL DUST AND PREVENTION OF COAL-DUST EXPLOSIONS

A limited supply of the following publications of the Bureau of Mines has been printed for free distribution. Requests for these publications should be addressed to the Director, Bureau of Mines.

The Bureau of Mines issues a list showing all its publications available for free distribution as well as those purchasable from the Superintendent of Documents, Government Printing Office. Interested persons should apply to the Director, Bureau of Mines, for a copy of the latest list.

### PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION

**BULLETIN 225.** Stone dusting or rock dusting to prevent coal-dust explosions, as practiced in Great Britain and France, by G. S. Rice. 1924. 57 pp.

**TECHNICAL PAPER 84.** Methods of preventing and limiting explosions in coal mines, by G. S. Rice, and L. M. Jones. 1915. 45 pp., 14 pls., 3 figs.

**TECHNICAL PAPER 144.** The quick determination of incombustible matter in coal and rock dust mixtures, by A. C. Fieldner, W. A. Selvig, and F. D. Osgood. 1918. 36 pp., 1 pl., 10 figs.

**MINERS' CIRCULAR 21.** What a miner can do to prevent explosions of gas and of coal dust, by G. S. Rice. 1915. 24 pp.

**MINERS' CIRCULAR 27.** Causes and prevention of fires and explosions in bituminous coal mines, by Edward Steidle. 1920. 75 pp., 117 figs.

### PUBLICATIONS THAT MAY BE OBTAINED ONLY FROM THE SUPERINTENDENT OF DOCUMENTS

**BULLETIN 20.** The explosibility of coal dust, by G. S. Rice, with chapters by J. C. W. Frazer, Axel Larson, Frank Haas, and Carl Scholz. 1911. 204 pp., 14 pls., 28 figs. 35 cents.

**BULLETIN 50.** A laboratory study of the inflammability of coal dust, by J. C. W. Frazer, E. J. Hoffman, and L. A. Scholl, jr. 1913. 10 cents.

**BULLETIN 56.** First series of coal-dust explosion tests in the experimental mine, by G. S. Rice, L. M. Jones, J. K. Clement, and W. L. Egy. 1913. 115 pp., 12 pls., 28 figs. 10 cents.

**BULLETIN 82.** International conference of mine experiment stations, Pittsburgh, Pa., September 14-21, 1912, compiled by G. S. Rice. 1914. 99 pp., 4 figs. 15 cents.

**BULLETIN 99.** Mine-ventilation stoppings with especial reference to coal mines in Illinois, by R. Y. Williams. 1915. 30 pp., 4 pls., 4 figs. 10 cents.

**BULLETIN 167.** Coal-dust explosion tests in the experimental mine, 1913 to 1918, inclusive, by G. S. Rice, L. M. Jones, W. L. Egy, and H. P. Greenwald. 1922. 639 pp., 31 pls., 82 figs. \$1.00.

**TECHNICAL PAPER 56.** Notes on the prevention of gas and dust explosions in coal mines, by G. S. Rice. 1913. 24 pp. 5 cents.

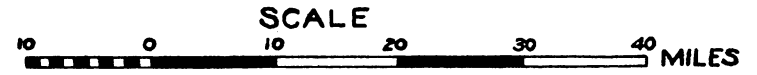
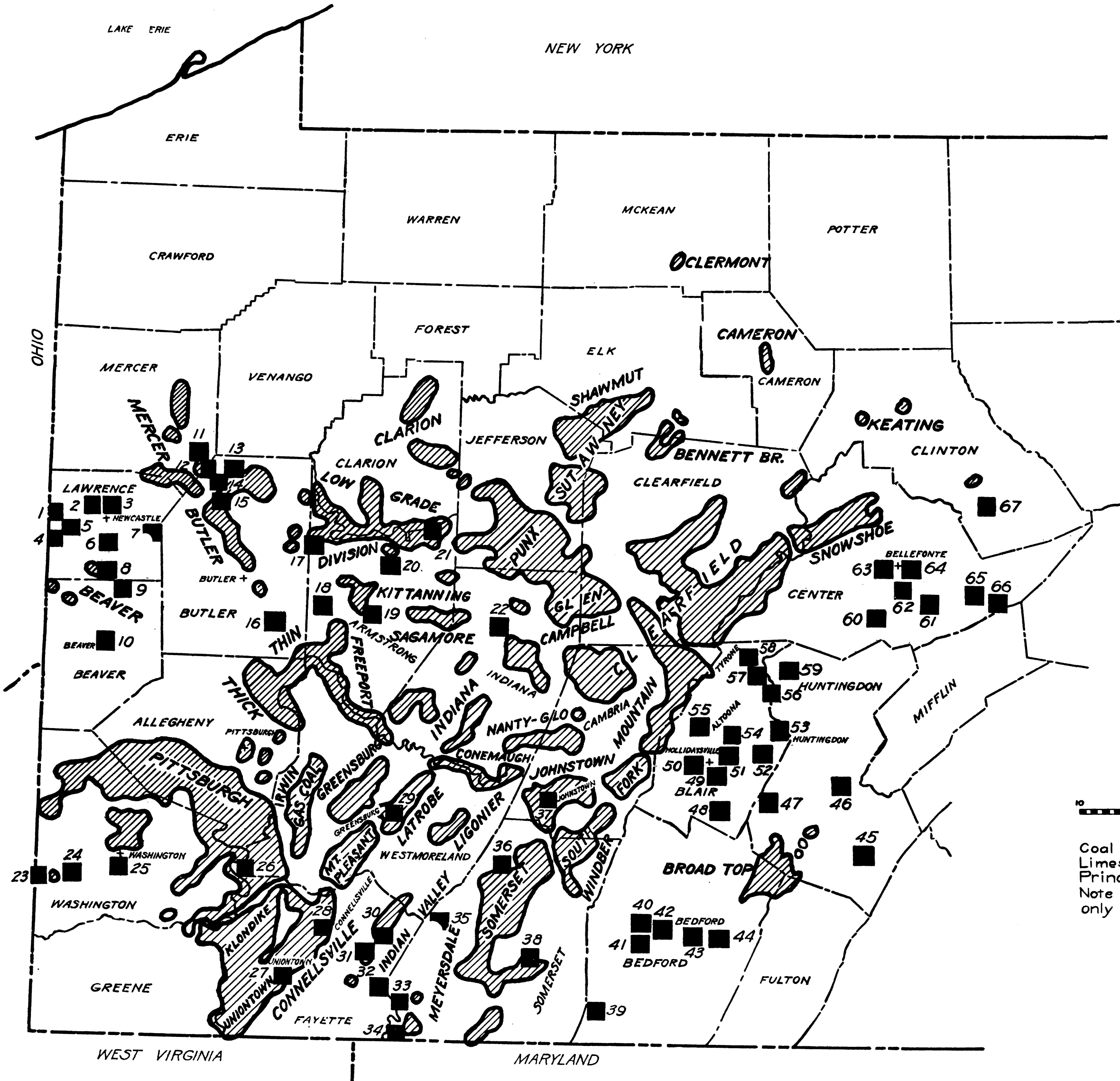
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**LEGEND**

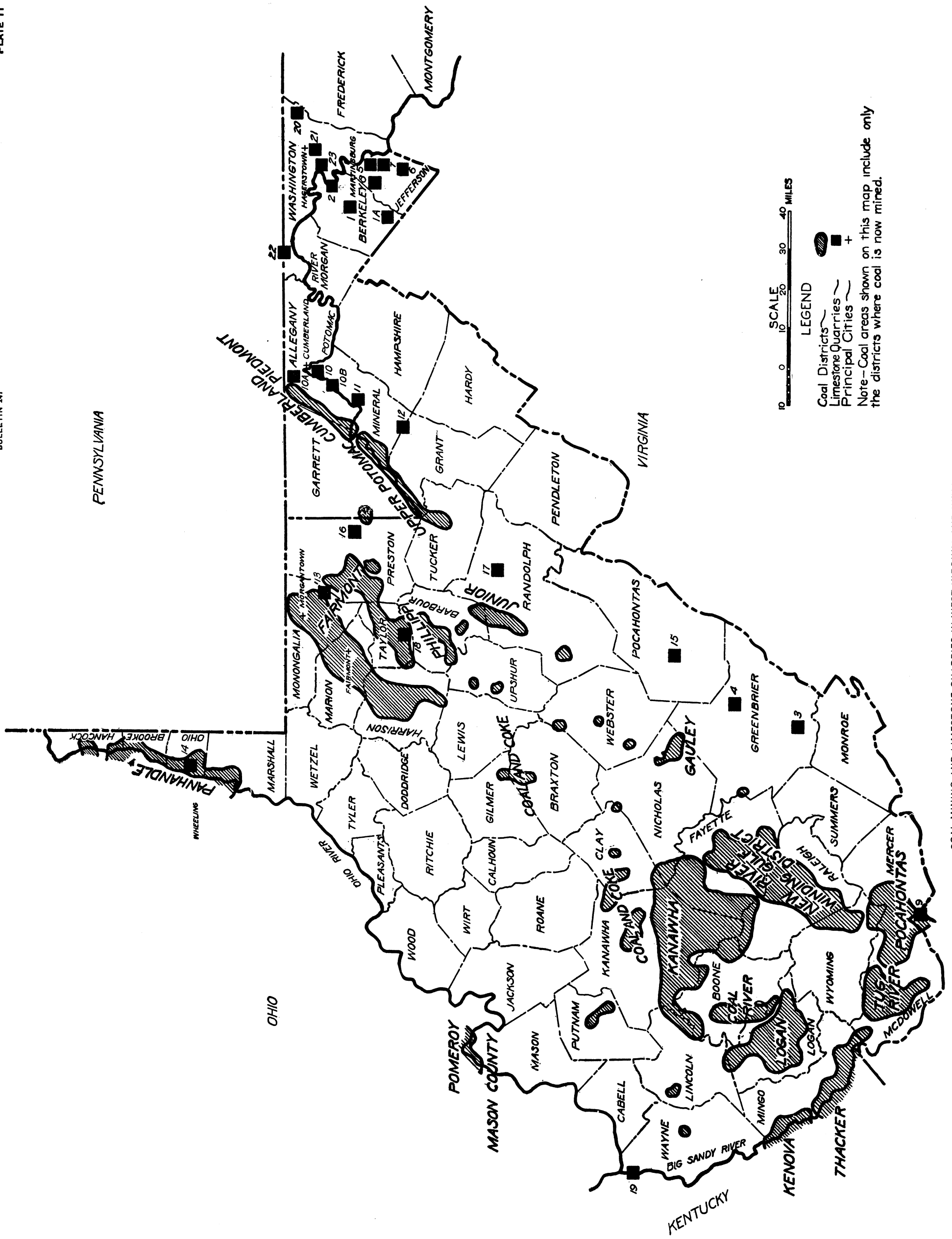
Coal Districts — (diagonal hatching)

Limestone Quarries — (square)

Principal Cities — (+)

Note — Coal areas shown on this map include only the districts where coal is now mined.

COAL-MINING DISTRICTS AND LIMESTONE QUARRIES IN WESTERN PENNSYLVANIA

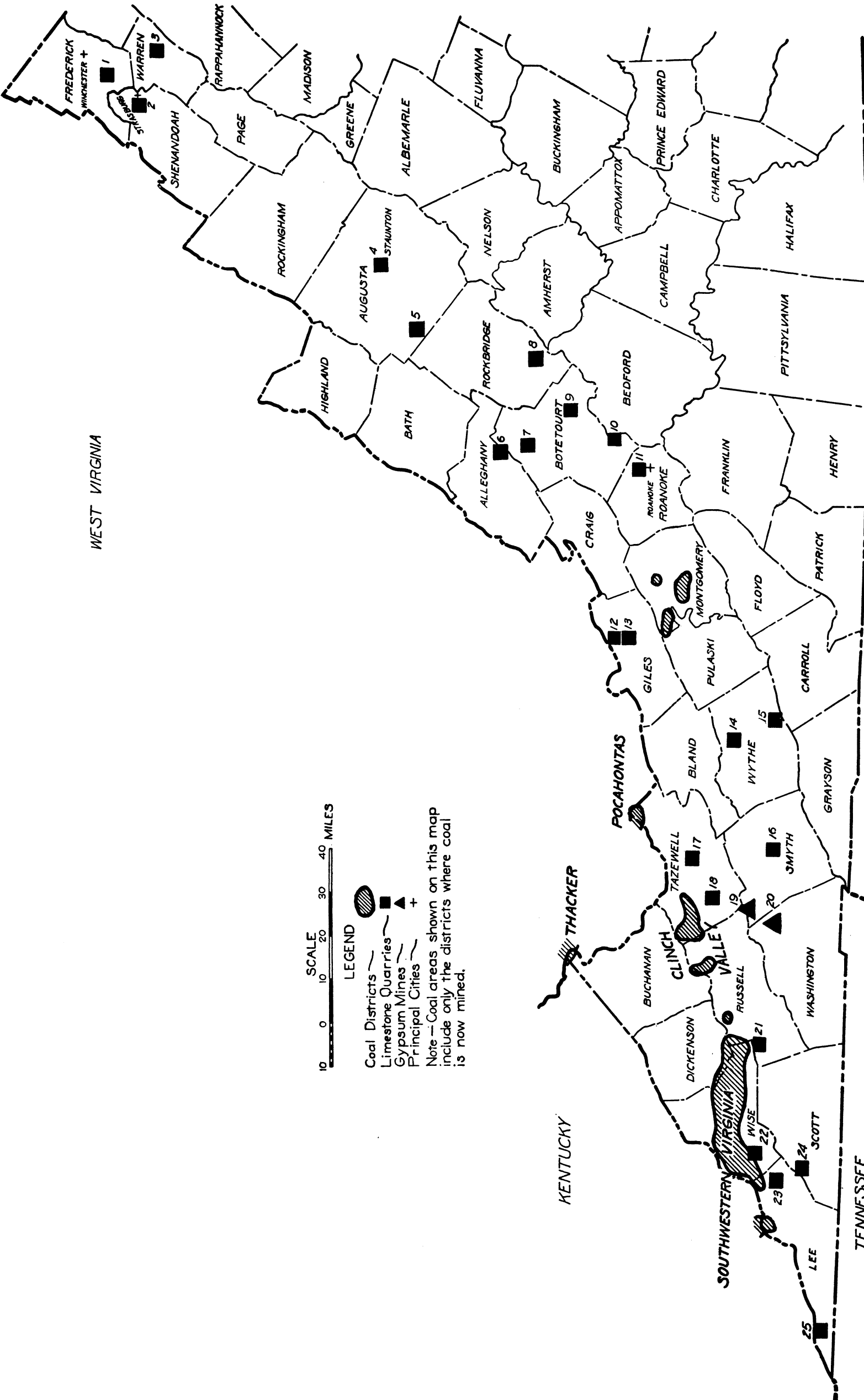


- LEGEND**
- Coal Districts
  - Limestone Quarries
  - Principal Cities

Note—Coal areas shown on this map include only the districts where coal is now mined.

COAL-MINING AND LIMESTONE QUARRIES IN WEST VIRGINIA AND WESTERN MARYLAND

WEST VIRGINIA

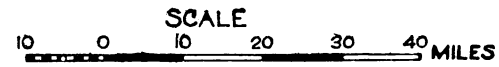


LEGEND

- Coal Districts
- Limestone Quarries
- Gypsum Mines
- Principal Cities

Note - Coal areas shown on this map include only the districts where coal is now mined.

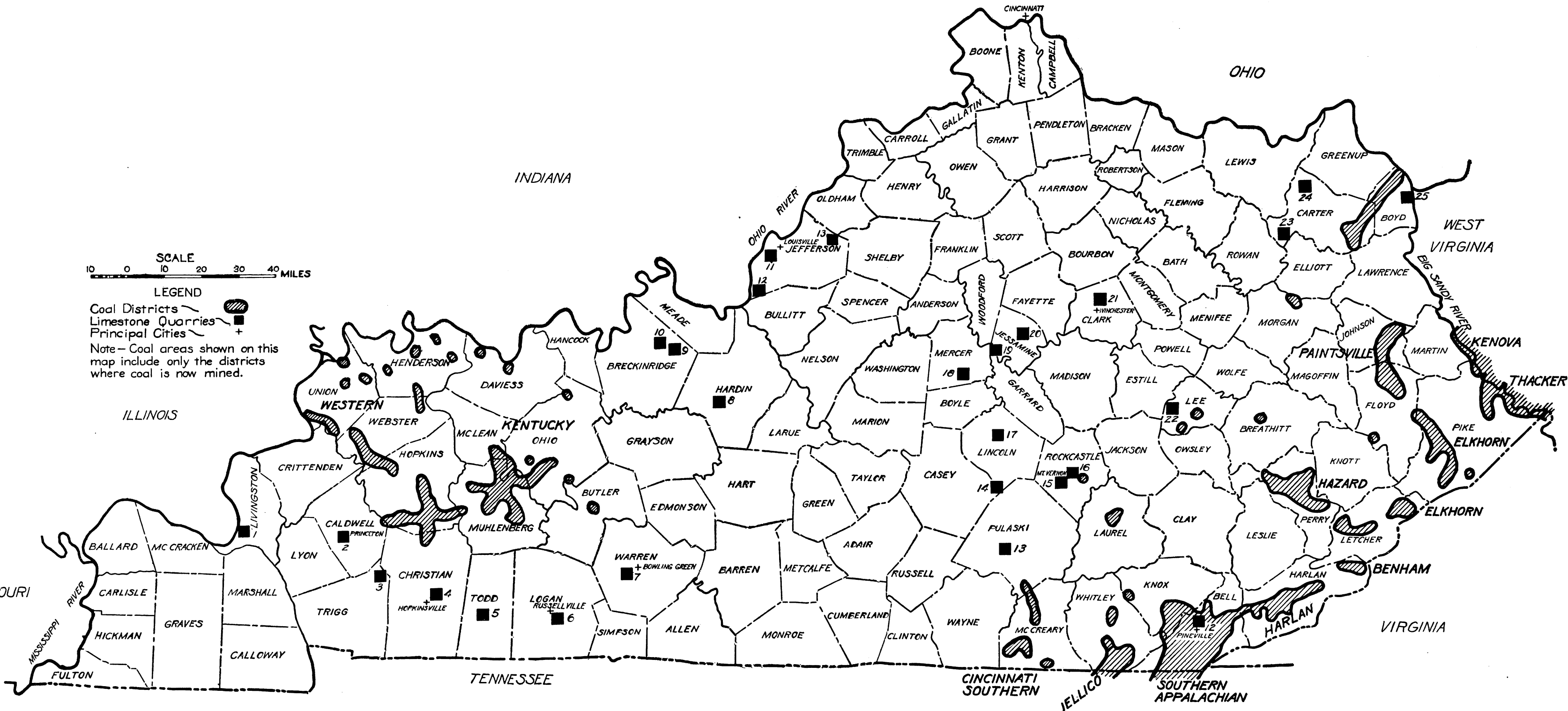
COAL-MINING DISTRICTS AND LIMESTONE QUARRIES IN WESTERN VIRGINIA



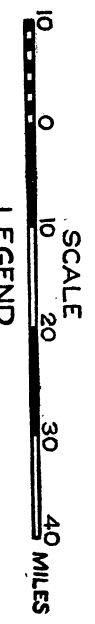
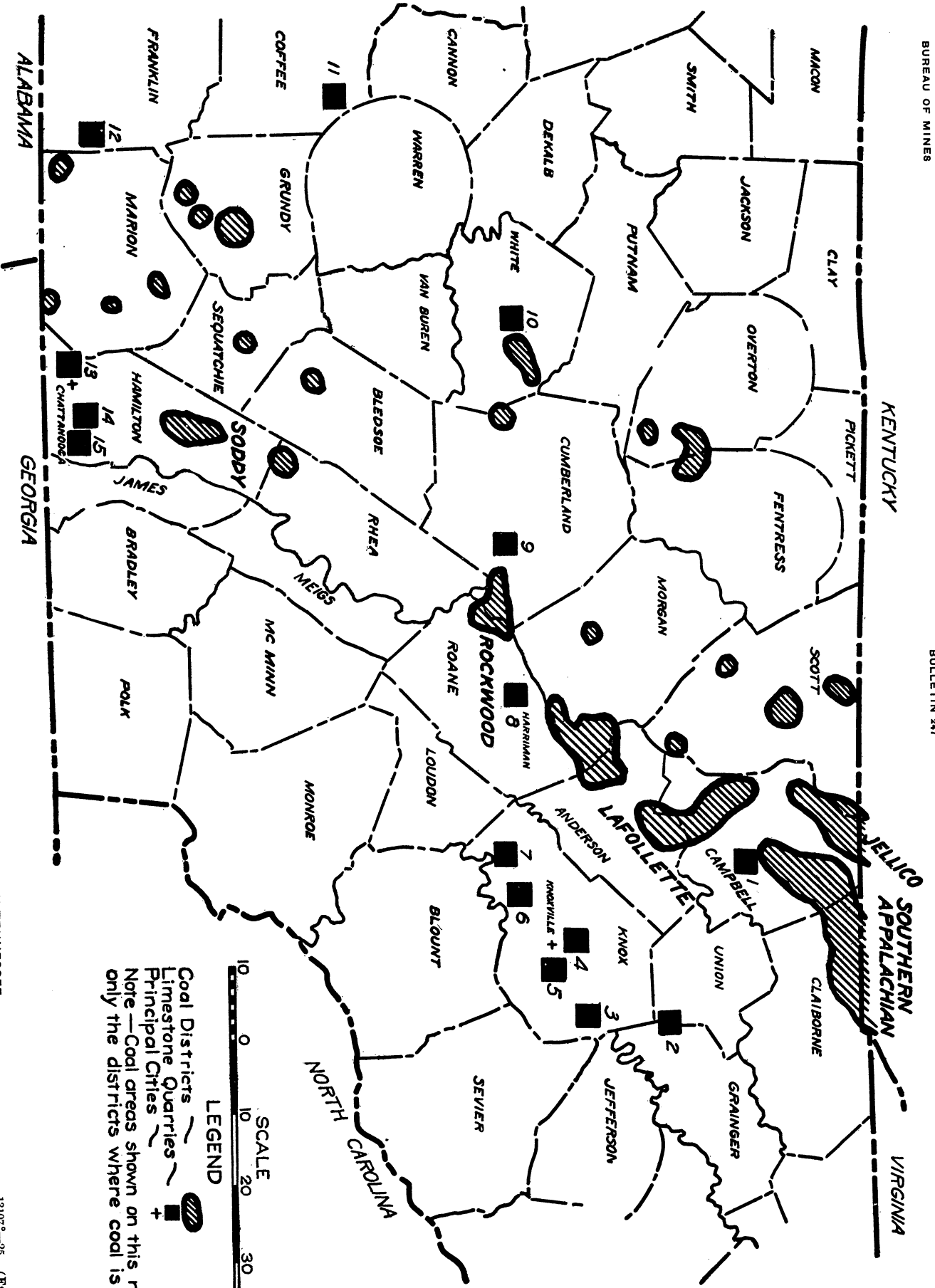
LEGEND

- Coal Districts
- Limestone Quarries
- Principal Cities

Note—Coal areas shown on this map include only the districts where coal is now mined.



COAL-MINING DISTRICTS AND LIMESTONE QUARRIES IN KENTUCKY



**LEGEND**

- Coal Districts
- Limestone Quarries
- Principal Cities

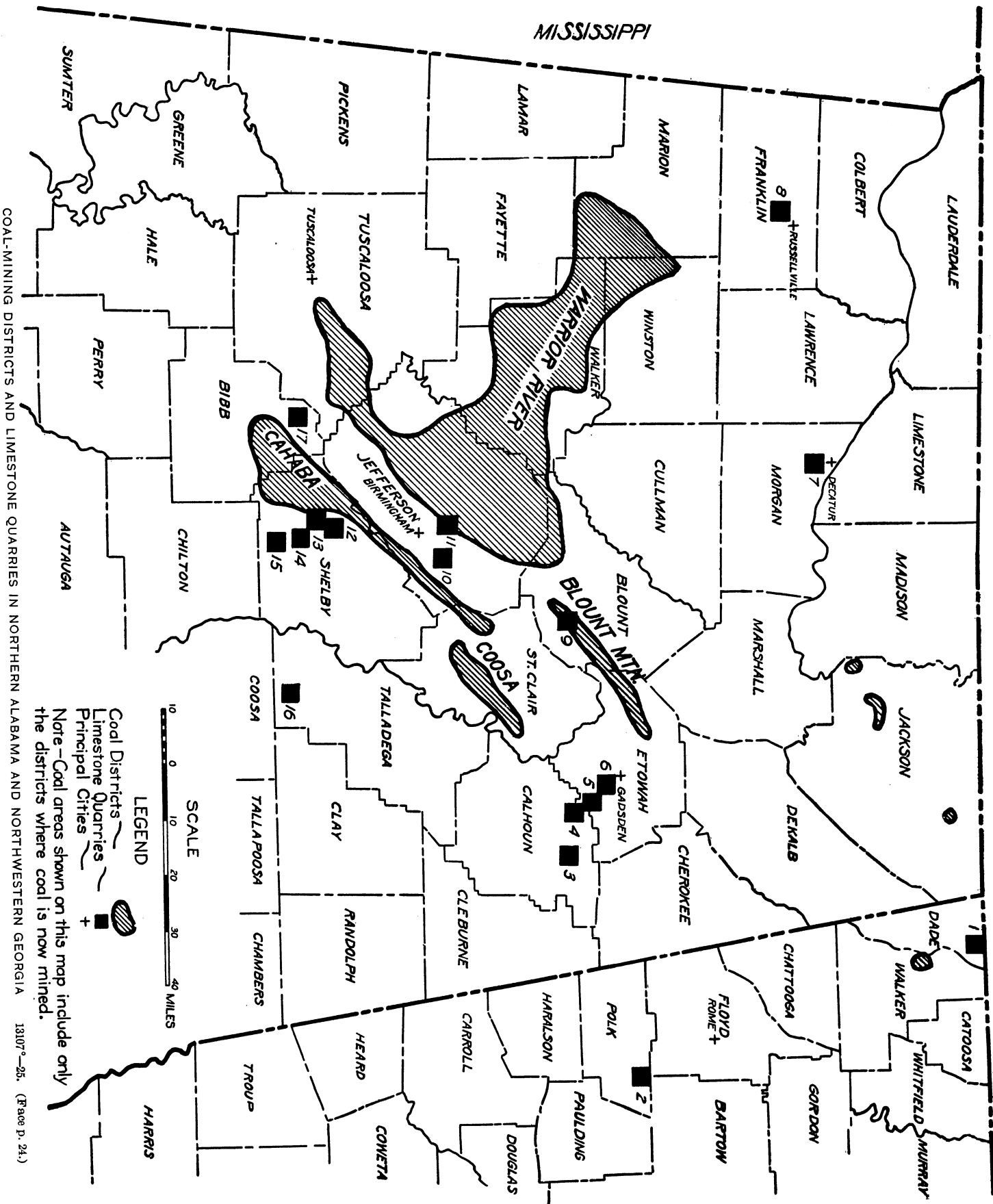
Note—Coal areas shown on this map include only the districts where coal is now mined.

COAL-MINING DISTRICTS AND LIMESTONE QUARRIES IN EASTERN TENNESSEE

13107<sup>a</sup>-25. (Face p. 22.)

TENNESSEE

MISSISSIPPI

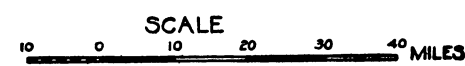
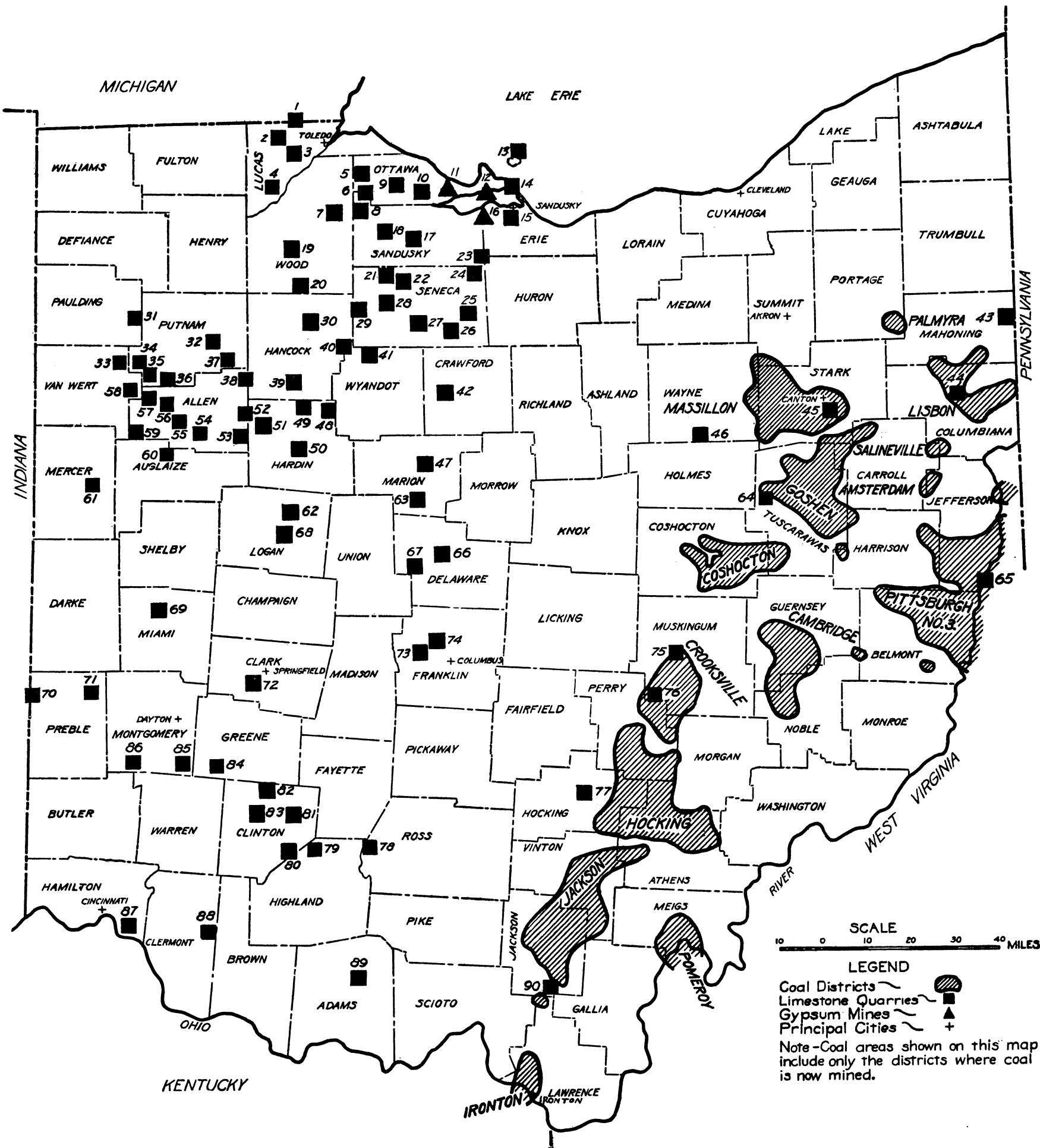


LEGEND

- Coal Districts (shaded area)
- Limestone Quarries (numbered square)
- Principal Cities (+)

Note - Coal areas shown on this map include only the districts where coal is now mined.

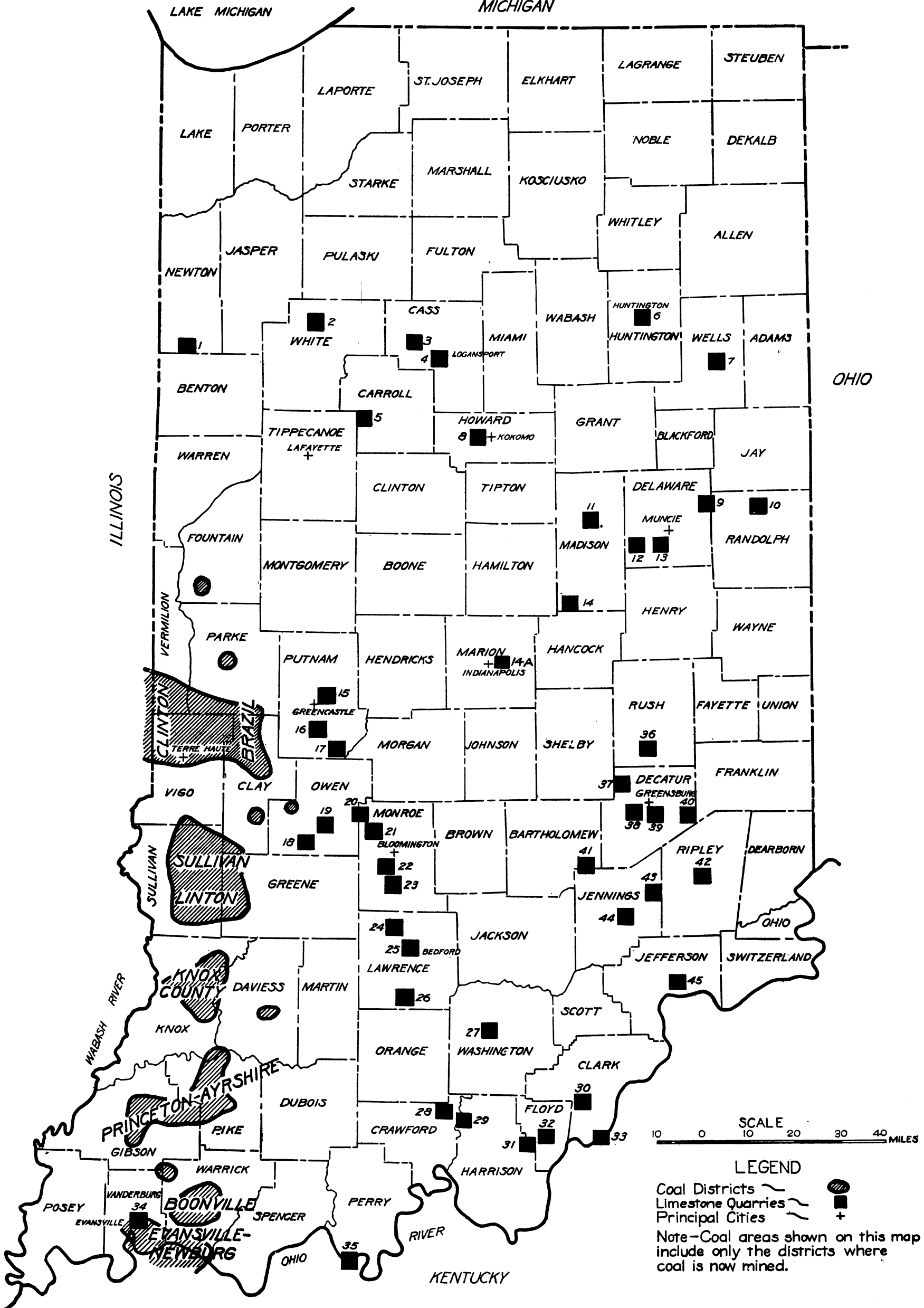
COAL-MINING DISTRICTS AND LIMESTONE QUARRIES IN NORTHERN ALABAMA AND NORTHWESTERN GEORGIA



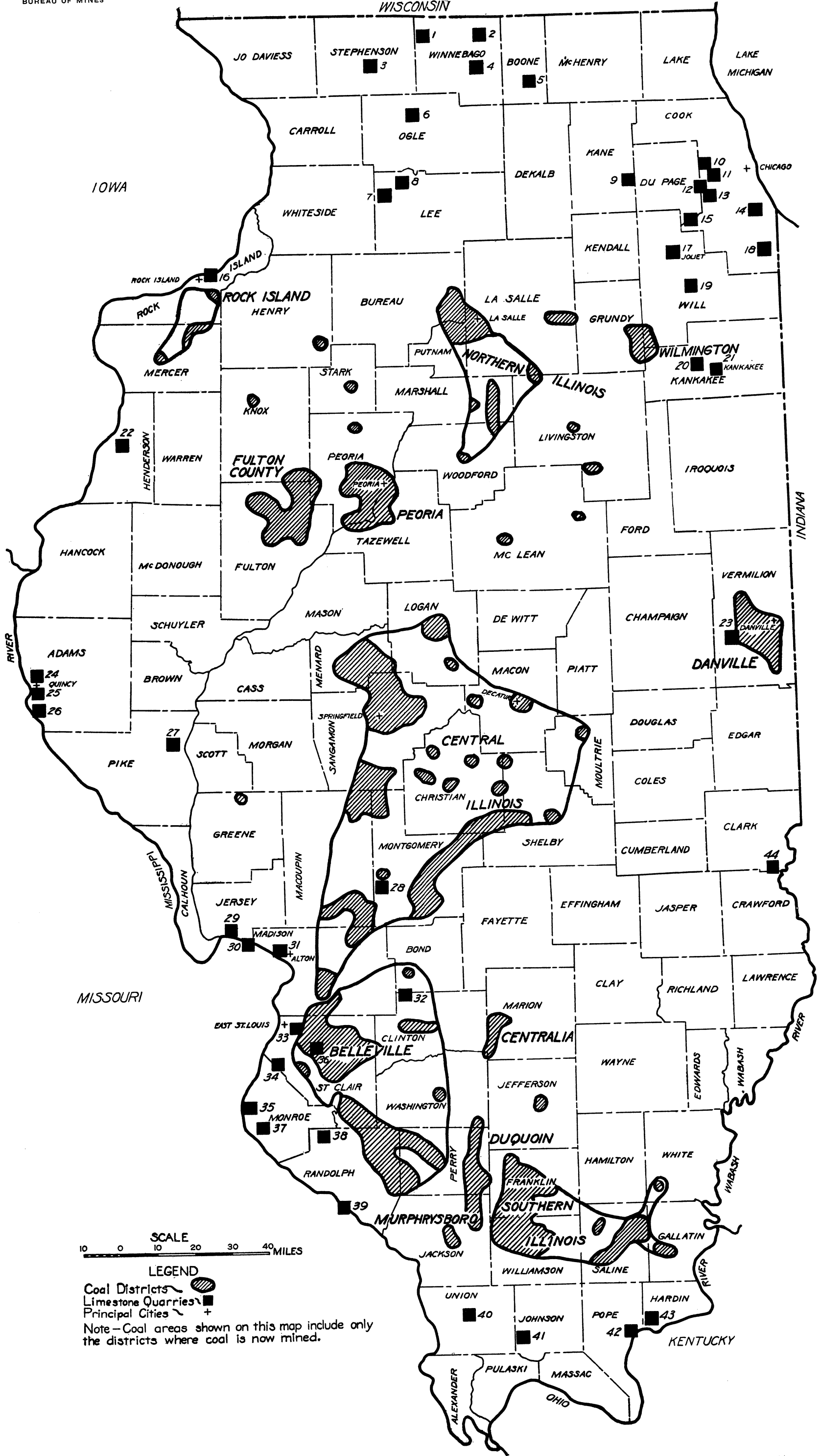
- LEGEND
- Coal Districts ~
  - Limestone Quarries ▲
  - Gypsum Mines ■
  - Principal Cities +

Note—Coal areas shown on this map include only the districts where coal is now mined.





COAL-MINING DISTRICTS AND LIMESTONE QUARRIES IN INDIANA

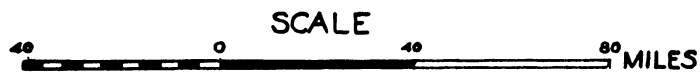


SCALE 0 10 20 30 40 MILES

**LEGEND**  
 Coal Districts (shaded area)  
 Limestone Quarries (square with number)  
 Principal Cities (plus sign)

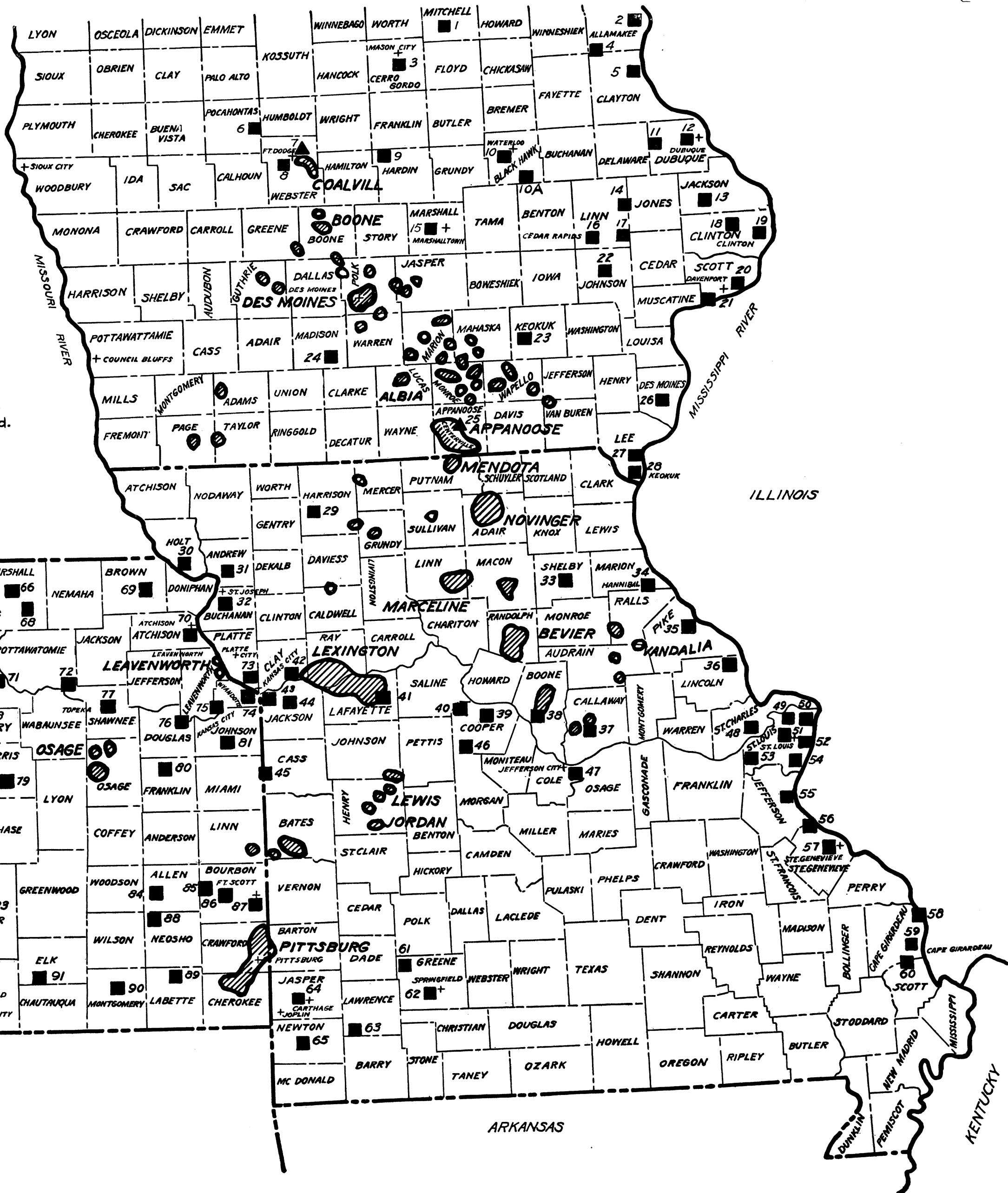
Note—Coal areas shown on this map include only the districts where coal is now mined.

NEBRASKA



LEGEND

- Coal Districts
  - Limestone Quarries
  - Gypsum Mines
  - Principal Cities
- Note—Coal areas shown on this map include only the districts where coal is now mined.



UTAH

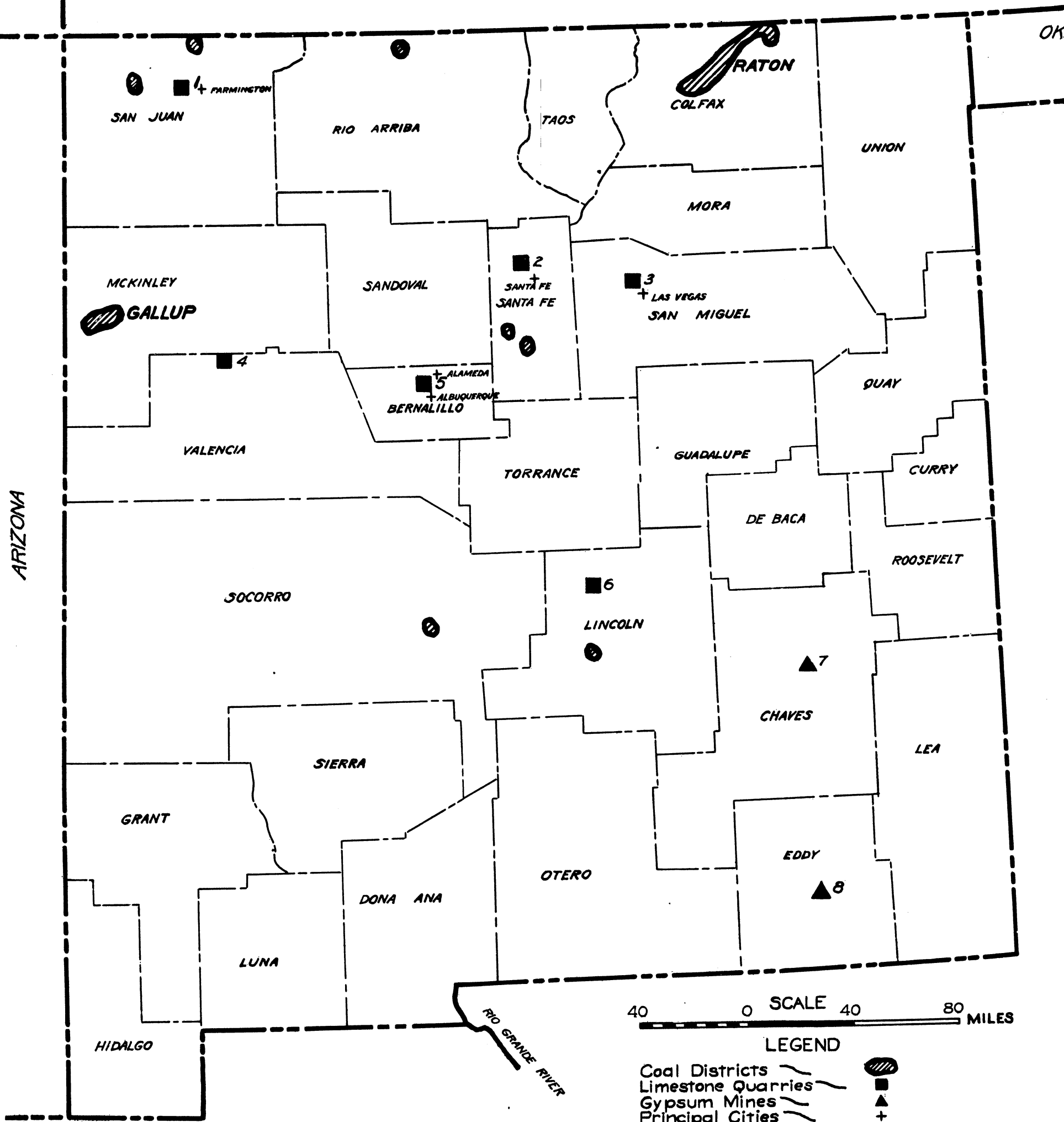
COLORADO

OKLAHOMA

TEXAS

ARIZONA

MEXICO

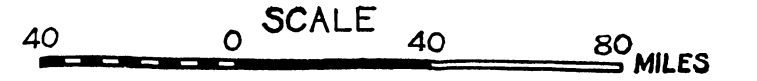


LEGEND

- Coal Districts
- Limestone Quarries
- Gypsum Mines
- Principal Cities

Note — Coal areas shown on this map include only the districts where coal is now mined.

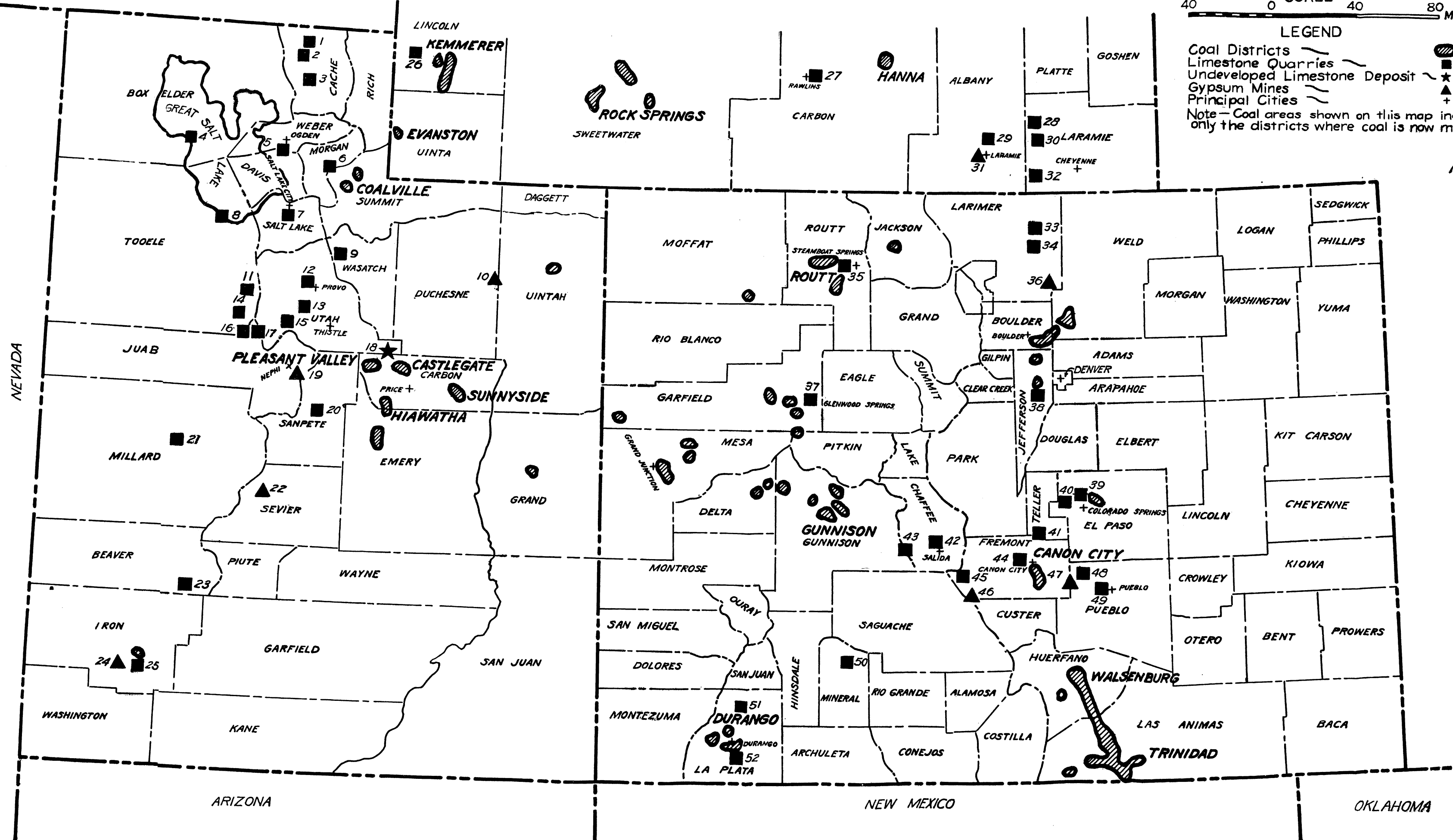
COAL-MINING DISTRICTS, LIMESTONE QUARRIES AND GYPSUM MINES IN NEW MEXICO



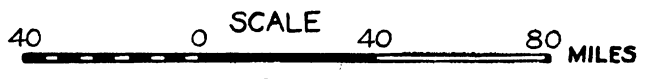
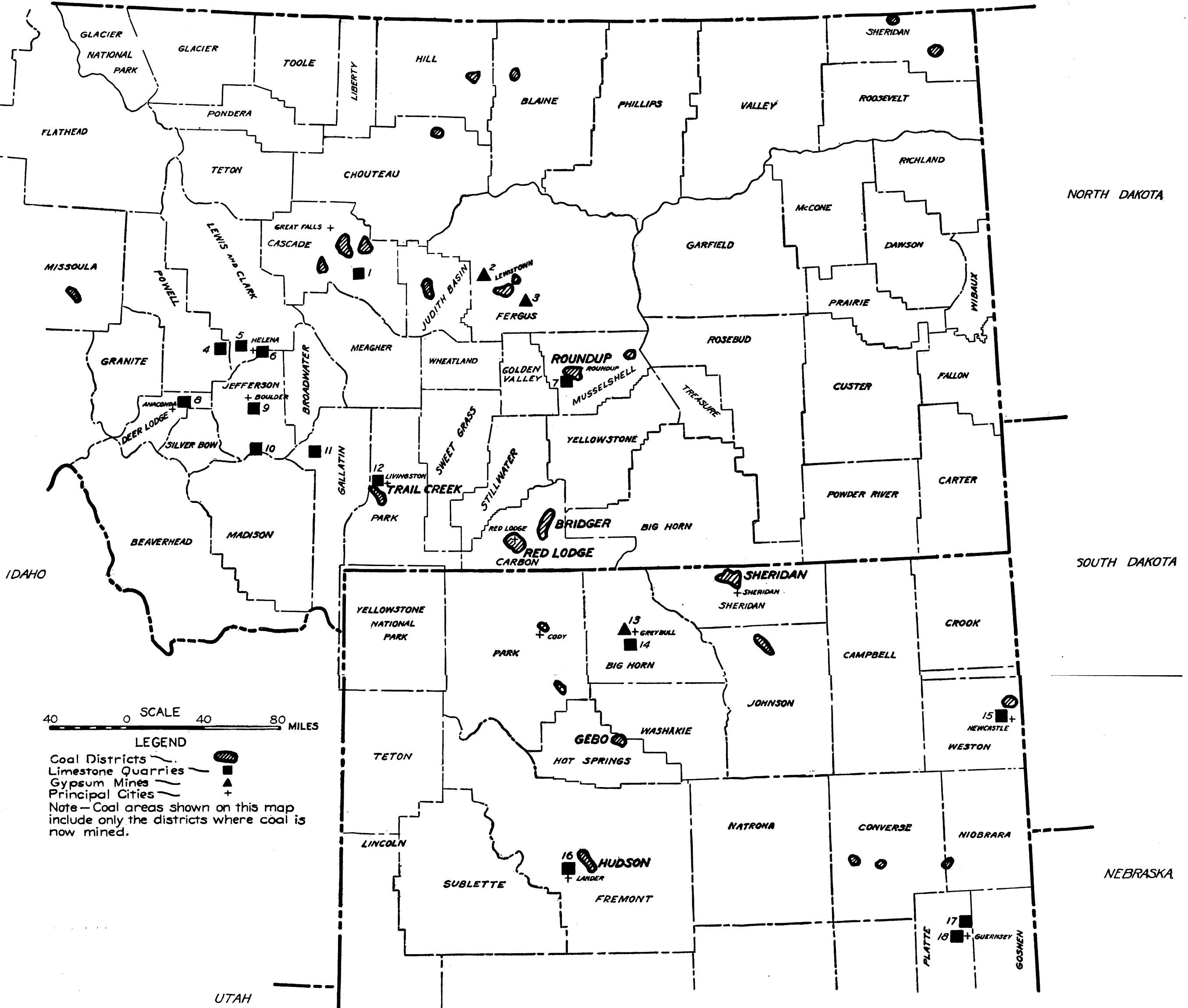
**LEGEND**

- Coal Districts
- Limestone Quarries
- Undeveloped Limestone Deposit
- Gypsum Mines
- Principal Cities

Note - Coal areas shown on this map include only the districts where coal is now mined.



COAL-MINING DISTRICTS, LIMESTONE QUARRIES, UNDEVELOPED LIMESTONE DEPOSITS, AND GYPSUM MINES IN COLORADO, UTAH, AND SOUTHERN WYOMING

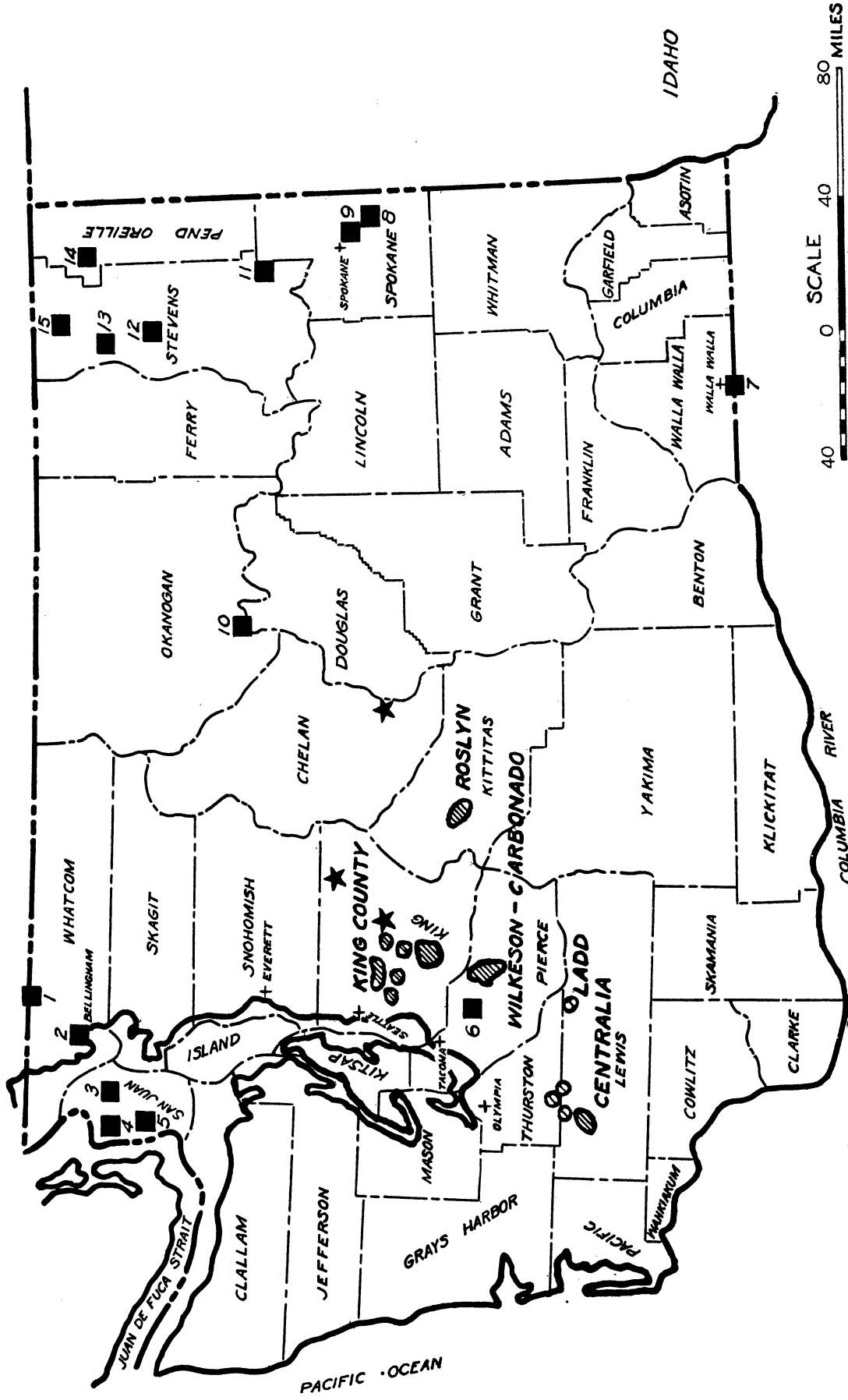


**LEGEND**

- Coal Districts
- Limestone Quarries
- Gypsum Mines
- Principal Cities

Note - Coal areas shown on this map include only the districts where coal is now mined.

COAL-MINING DISTRICTS, LIMESTONE QUARRIES, AND GYPSUM MINES IN MONTANA AND NORTHERN WYOMING



LEGEND

- Coal Districts
  - Limestone Quarries
  - Undeveloped Limestone Deposit
  - Principal Cities
- Note—Coal areas shown on this map include only the districts where coal is now mined.