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ILLINOIS STATE
GEOLOGICAL SURVEY

Maps and Mapping in Kaskaskia Valley

by

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Apology

In attempting to discuss the topic of maps and mapping there is no pretension that the field is here thoroughly canvassed nor that all available maps are listed, for no one can be readily conversant with all the various types of maps that have been compiled, issued, or published by innumerable individuals, professional organizations, and commercial agencies through the years. Moreover, any fairly complete list must be out of date almost as soon as issued, for new maps are constantly being made and published. Consequently this discussion lists only the better known important maps; others probably of equal importance, especially special-use maps, are lacking because their existence was not made known by workers each in their own fields.

Types of maps available

The principal types of maps available are (1) planimetric or outline base maps of various kinds, with varying degree of accuracy, and on an ~~almost infinite~~ ^{considerable} wide range of scales; (2) standard topographic maps which not only provide a base accurate to scale but also depict with equal accuracy the relief, the drainage, the culture,

and other features, ^{and} (3) special-use maps, such as drainage maps, forest-area maps, population maps, school maps, railroad maps, highway maps, farm ownership maps, geologic maps, structure maps, industry maps, and so on almost ad infinitum, ~~and~~ soil maps, which although typically special-use maps, are of sufficient accuracy and depict a sufficient number of features other than soil types that they merit special mention.

The fundamental outline base map for Kaskaskia Valley is the base map of Illinois published by ^{the Illinois State Geological Survey and cooperating.} the U. S. Geological Survey, ^{It} is on a scale of 1:500,000 (approximately 1 inch = 8 miles) and is available either with or without red overprint. A photogravure reproduction of the plain base map is also available on half the scale (1:1,000,000) and is therefore commonly referred to as the "millionth map." Outline maps for individual counties are available from several agencies, but none of them are strictly accurate. Blue-print county maps on a scale of one inch to a mile may be purchased from the U. S. Postoffice Department and from the State or county highway divisions; county maps of all kinds, types, and scales are available from a wide variety of commercial agencies. Farm plat or ownership maps, either by county or township, may also be secured from various commercial firms, and of course municipal plat maps are available for every village, town, or city of appreciable size. The State highway maps issued on a scale of 1 inch = 4 miles are especially adaptable to some other purposes, as are those on the smaller scale of approximately 1 inch = ^{12 1/2} ~~10~~ miles issued as highway guides.

Topographic maps are available for a number of quadrangles and for some other areas in the valley. (See accompanying index map.) Most of them are on a scale of 1:62500 (about 1 inch = 1 mile) but some of them, especially those for odd areas, are on a scale of 1:48000 or 1:24000. These maps are strictly accurate within the limits of their scale and as of date of survey and are utilized wherever accuracy is desired. ¶ Special-use maps are prepared by and available from every organization whose work is of such nature that it can or must be depicted on maps. Their variety is too great to permit listing. ~~However, special attention has already been directed to the soil maps issued by the State Soil Survey and to the State highway maps of various scale, all of which are of value and adaptable for other purposes.~~

Need for maps

No planning or construction project can be satisfactorily prosecuted without adequate maps, and to the extent that maps are lacking for parts of Kaskaskia Valley the planning and execution of any contemplated or proposed projects is handicapped. Topographic maps for all of the valley are essential, as they are the prime accurate base maps on which all work may be satisfactorily planned. Aerial photographs of the valley are highly desirable, especially when made up accurately as mosaics or "picture maps," as they supplement the topographic maps by providing additional data and expedite the topographic mapping itself. From a complete set of topographic

maps, supplementing^{ed} by aerial mosaics, it is possible to prepare accurate outline maps of any scale. The need of special-use maps is concomitant with the work prosecuted in any field of special endeavor - it is almost too obvious for mention that not only should special-use maps for every purpose be available for the entire valley but they should be kept up to date.

Procedure for mapping

The topographic maps ~~have been and will probably continue~~^{are} to be made by the Illinois State Geological Survey and the U. S. Geological Survey cooperating, ~~on a half-half basis, with the U. S. Survey providing the equipment, technical supervision, and trained personnel.~~ Practically all of the horizontal and vertical control requisite for topographic mapping in the valley has been completed; the incomplete portions will be completed in 1937. According to the present proposed program, the topographic mapping for the entire State will be completed in 1945; much of the unmapped portion of Kaskaskia Valley will be completed by 1940, but unless some express urgency arises to necessitate favoring the valley over the rest of the State its entire completion will coincide with the scheduled completion of the whole State. Of course, the scheduled completion depends on approval of and adherence to the proposed program, as expressed by financial appropriations by both the State Assembly and Federal Congress; any deviation from the program, by appropriation either less or more than proposed, will respectively extend or hasten completion.

As soon as a whole or part of a quadrangle has been topographically mapped, the resulting pencil sketch is started on the way towards eventual publication as an engraved map. The sketching is first inked in; an advance photolithographic edition is prepared and issued; and finally the engraved edition is published. The advance maps are usually issued within the year following the season in which the sketching was done; the engraved maps may not be issued for three or more years, at present, on account of the congestion in the Federal agency resulting from lack of funds. Photographic reproductions of the pencil or pen sketching may be obtained in advance of the photolithographic edition if the need is urgent.

Interest in aerial photography, as its possible application to and consequent value in various projects is being better realized, is increasing to such an extent that there is good reason to believe that it may lead in the near future to a demand for the aerial photography of the entire State. If such a demand should not materialize, the chances for aerial photography of Kaskaskia Valley will depend on the local demand. Whatever photography is done must be adjusted to the horizontal control already established by the *(the determination of linear distances and of areas.* geological surveys, in order to be accurate for ~~use for various purposes.~~ purposes. The composition of accurate mosaics, probably the most generally useful form of aerial photographs, is especially dependent on the horizontal control.

Attempts have been made to get aerial photographs and topographic maps of Kaskaskia Valley made as a P.W.A. or W.P.A. or some other special project, but to date none have been successful, ^{*in view of their general wide utility*} so that at present it appears that the best chance of getting them made is to enlist support ~~stronger than ever~~ for governmental appropriation sufficient to cover the cost.

The preparation and publication of special-use maps are also dependent largely on available funds, which have been almost universally curtailed during the recent economic depression. The expedition with which they may be executed hereafter will depend not only on available funds but also on available personnel as distributed to take care of all demands throughout the State. The State Highway Division has been engaged in making a detailed study of the roads and accessory features in the State, and it is anticipated that in the near future they will have available for every county, highway maps of greater accuracy than have been heretofore issued. These undoubtedly will be of great value and use, especially for areas for which topographic maps are not available.

List of available maps

As already stated, the following list of maps is not complete; in fact, it is purposely restricted to the more fundamental maps. Most special-use maps, valuable as they are, are omitted because not even a representative list can be compiled; inquiry concerning possible special-use maps should be directed to the

appropriate organization or individual, most of which are indicated in the report. Neither are the host of commercial maps nor even the principal commercial map firms listed; information on them may be obtained upon request of the State Geological Survey and similar organizations.

Base Map of Illinois. Illinois State Geological Survey, in cooperation with U. S. Geological Survey. Fifth edition, 1924.

Size 30 by 51 inches, scale 1:500,000 or approximately 8 miles to the inch. County and township lines, towns, railroads, rivers and lakes shown in black. Price, 25 cents.

Same, with elevation above sea-level of more than 2,000 towns shown in red. Price, 50 cents.

Also published on a scale of 1:1,000,000, or about 16 miles to 1 inch; size, 17 by 25 inches. Price, 5 cents.

Topographic Maps. Illinois State Geological Survey, in cooperation with the United States Geological Survey.

Quadrangle maps. These maps cover unit areas or quadrangle bounded by parallels and meridans rather than by county lines. Each quadrangle has been given the name of an important town within its limits. The maps are comprehensive in that they show all that the ordinary geographic maps show and in addition the relief and configuration of the land surface, elevation above sea-level, and watersheds and they distinguish churches, schools, cemeteries, and individual houses, where the scale permits. Some of the maps are also published with green overprints showing woodland areas. The

more recent maps have also a red overprint showing the paved highways.

The maps of the standard quadrangles cover approximately 225 square miles and are published on a scale of 1:62,500 or about one inch to the mile; a few include only about 55 square miles and are published on a scale of 1:24,000 or about 2 1/4 inches to the mile.

Single engraved quadrangle maps may be purchased for 10 cents each, or for 8 cents in lots of 50 or more. A limited supply of photolithographic maps (brown print only) for quadrangles for which the engraved maps are not yet available may be secured for urgent purposes.

The available topographic maps are indicated on the accompanying map. Payment for topographic maps should be made to Enid Townley, Map Agent, 305 Ceramics Bldg., Urbana, Ill.

County maps. For some counties that have been completely surveyed topographic maps similar to quadrangle maps have been published. The maps are prepared on a scale of 1:62,500, or about a mile to an inch, and are engraved in four colors. Price, 25 cents each; mounted on cloth when available, 50 cents each.

Clinton County (available mounted)

Monroe County (available mounted)

Randolph County

St. Clair County (out of print)

Special Kaskaskia Valley Drainage Maps, from Mississippi River to Fayette-Shelby County line, 13 sheets. Scale of 1:24,000, or about 2 1/4 inches to the mile; contour interval 5 feet. Price, complete set, 50 cents.

Special Use Maps

Soil maps. These are prepared on a scale of 1 inch = 1 mile and are issued on a scale of 1 inch = 2 miles. In addition to showing by color and pattern various types of soil, they are relatively accurate as regards highways, streams, railways, section and township lines, towns, etc., and consequently can be adapted for base maps for other purposes. They may be secured upon request of the State Soil Survey, University of Illinois.

Reports including maps are available for Bond, Champaign, Coles, Douglas, Effingham, Fayette, Macon, Marion, Macoupin, Moultrie, Piatt, and Randolph counties. Printed maps without reports are available for Monroe, St. Clair, and Washington counties. Field maps for some of the counties for which no maps have yet been published are available for reference in the Soil Survey files.

Highway maps. 1. Scale 1 inch = 4 miles, with red overprint showing highways. Shows county, township, and section lines, streams, etc. Set of 3 sheets. Price, \$1.25, State Highway Division, Springfield.

2. Highway guide map, scale 1 inch = 12 1/2 miles. Shows county lines and principal highways. Available upon request at

State, District, County, and other highway offices.

3. County highway maps, 1 inch = 1 mile, blueprints. Also black-line or blueprints on varying smaller scale. State Highway Division.

Drainage map of Illinois. Illinois State Geological Survey. 1928. Size, 31 by 52 inches, scale 1:500,000 or approximately 8 miles to the inch. Engraved in colors. This map shows the status of drainage reclamation as of January 1, 1928. It gives the locations of (1) all organized drainage, levee, and sanitary districts, (2) districts being organized, (3) areas partly or wholly unproductive due to overflow conditions, and (4) a few upland areas which need better drainage. Map accompanies Bulletin 42 but a limited number may be obtained separate from the bulletin. Price, 50 cents.

Mineral industries map. Illinois State Geological Survey. 1930. Size 31 by 52 inches; scale approximately 8 miles to the inch. Engraved in four colors. Shows locations of oil and gas fields, coal field boundary, refineries, mines, pits, quarries, etc., and is accompanied by a directory giving names and addresses of all operators for whom locations are given on the map. Directory is arranged alphabetically, both by industry and by county. Price, 50 cents.

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ILLINOIS STATE
GEOLOGICAL SURVEY

SURFICIAL AND SUBSURFACE GEOLOGY AND STRUCTURE
OF KASKASKIA VALLEY

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Physical Setting

Rising near Champaign, Kaskaskia River pursues a general southwest course across Illinois to empty into Mississippi River at Fort Gage, a few miles above Chester. The direct distance from its source to its mouth is about 180 miles, but owing to its curves and meanders the stream itself is much longer, possibly twice as long.

The basin it drains is generally lanceolate in outline, *(See accompanying map.)* with a maximum width of about 60 miles in a belt lying between lines from Edwardsville to Centralia and from Raymond to St. Elmo. A few miles above Shelbyville the width is locally constricted to about 20 miles. The area of the basin is approximately 6000 square miles.

Physiographically, Kaskaskia Valley lies in the Till Plains section of the Central Lowland province of the Interior Plains division of North America. Geologically, it lies in Illinois Basin, a structural depression that includes most of the State and parts of adjacent states.

Topography

Not only is Kaskaskia Valley entirely a plains region but also much of it consists of typical flat or gently rolling prairies. However, a few moderately to highly undulatory ridged belts cross the valley, and scattered about are also a number of more or less isolated hills, some of considerable extent and height. One of the ridged belts enters the valley from the east and crosses the river a few miles above Evansville, swings north along the west side of the river across Monroe County, and thence continues northward east of Belleville. Another belt, in places consisting of separate hills, begins west and northwest of Shelbyville, follows the west side of the river to and a little beyond Vandalia, thence swings westward across Bond County, and loops northward between Hillsboro and Litchfield. A third belt crosses the valley at Shelbyville and is responsible for the construction of the basin as already noted. A fourth belt, which forms for a considerable distance the divide between the Kaskaskia and Sangamon river basins, begins near Mahomet, trends southwestward past Monticello and Cerro Gordo, thence swings southward and southeastward to cross Kaskaskia River in the vicinity of Sullivan, and thence continues eastward across northern Coles County. A fifth ridge, running north and south near Tolono, forms the divide between the Kaskaskia and Embarrass river basins there, and in a sixth ridge running northwest from Champaign is found the origin of Kaskaskia River itself. Isolated hills not associated with ridged belts occur principally in Clinton County, with especially large ones near Carlyle, and in eastern Fayette County east of Vandalia.

The river system of most of Kaskaskia Valley is well developed, so that only a small proportion of its area lacks access to some stream. This is especially true in the lowermost part of the basin, below Evansville, where because of several favorable factors, particularly proximity to the mouth of the master stream, the tributary streams have dissected practically the entire upland plain and so created a "hilly" region of residual ridges between their valleys. In this area, too, there are numerous sink holes which add to its irregularity. Kaskaskia River itself and some of its larger tributaries have broad, flat-bottomed, poorly drained, terraced valleys in which the streams meander from side to side, creating o~~x~~-bow lakes from abandoned meanders as they shift their courses from time to time. A marked change from a broad to a narrow valley occurs where the third ridged belt crosses Kaskaskia River at Shelbyville.

Surficial Material

The entire Kaskaskia Valley is, or once was, covered with glacial drift, but subsequent to its deposition the streams have not only cut into it but in some places have cut entirely through it so that bedrock is exposed. The drift generally consists of a silty, sandy, pebbly, bouldery clay, known as till, but locally, especially in some parts of the ridged belts and in most of the isolated hills, it consists of a gravel or gravelly clay. It was distributed more or less evenly over the area as the glacier which bore it melted away, but was concentrated in the ridged belts, known as moraines, which mark the position of the ice margin/^{whenever}advance

of the glacier was balanced by melting. The succession of ridged belts represents a succession of retreats and readvances of the ice front. The total thickness of drift varies from a few feet to nearly three hundred feet.

The surficial drift is known to be of two ages, designated respectively Illinoian and Wisconsin, separated by an interglacial period of considerable duration. The moraine that crosses Kaskaskia River at Shelbyville and is known by that name marks the maximum advance of the Wisconsin glacier. A still older drift, the Kansan, which is known to underlie the Illinoian, in much of the valley, crops out at a few places.

The glacial drift is mantled by a deposit of silt, known as loess, which during and for a relatively brief period subsequent to glaciation was picked up, transported, distributed, and deposited over the upland plains by the wind. It varies in thickness, being as much as 60 or 80 feet thick along the bluffs of Mississippi River where it forms a marked ridge capping the bluffs, and thinning rapidly away from the principal valleys, from which it was derived, until it is hardly a foot thick at some "inland" localities.

As the glaciers melted, the water thereby released escaped through the valleys heading in the margin of the glacier. It carried with it some of the drift materials in the glacier and distributed them along the valleys. Consequently in a few places, especially in the valleys heading in the Shelbyville moraine, there are limited deposits of sand and fine gravel outwash, and much of the material comprising the terraces as well as the flat bottomland along Kaskaskia River and its major tributaries is sand and silt outwash.

As the streams proceeded to erode their valleys subsequent to glaciation, they carried away clay, silt, sand, and gravel and deposited some of it along the lower parts of their valleys and in the major valleys below, and in such manner have the flat, poorly drained, bottomlands been built up.

Also, since glaciation, the various weathering and other processes have operated on the glacial drift and loess to develop from them the soil, basic for the agricultural industry.

Bedrock

Beneath the glacial drift and stream alluvium lies a continuous floor of bedrock, which is exposed to view only in the limited outcrops already mentioned but which is known from every well, boring, and excavation that has penetrated the drift. The wells and other borings that go into the bedrock reveal that it consists mainly of limestone, sandstone, and shale, with some beds of coal and underclay in the upper part, all lying in strata or formations one upon the other, the youngest at the top.

When the materials comprising the formations were deposited, the beds were practically horizontal but subsequently they have been ^{warped} folded and tilted, raised above the sea in which they formed, and exposed to erosion. This erosion continued so long that the entire area was reduced to practically a level plain that beveled the tilted beds; consequently, the bedrock that now lies immediately beneath the glacial drift and is exposed in outcrops belongs not to one but to several strata successively older towards the periphery of the basin (see cross-sections.) No

outcrops occur in Champaign, Piatt, Douglas, or Moultrie counties.

The rocks exposed in outcrops all belong to the Pennsylvanian ("Coal Measures") and Mississippian systems, with the latter restricted to an area in the lower part of Kaskaskia Valley, lying southwest of the diagonal Monroe-St. Clair county-line as extended southeast to Baldwin. ^(See accompanying map) The Pennsylvanian system consists of a more or less regularly repeated succession of beds, known as cyclothems, which typically consists from top down of (1) clayey or silty shale, (2) limestone, (3) black silty shale, known by miners as "slate," (4) coal, (5) underclay, and (6) sandstone or siltstone. These constituent members of cyclothems are rarely more than a few feet thick and may be only a few inches thick; not infrequently some of them seem to be entirely lacking. The Chester or Upper Mississippian series consist of a more or less regularly repeated succession of sandstone, shale, and sandstone formations generally only a few tens of feet thick at most, and the exposed lower Mississippian formations consist of dense, fairly pure limestone scores of feet thick.

The unexposed, older bedrock formations revealed by well borings belong successively to the lower Mississippian, the Devonian, the Silurian, ^(See geological legend on accompanying map) and the Ordovician systems. All except the lower Mississippian formations are mainly solid limestones, the exception being a shaly formation or a group of thin shaly formations in the basal part. All of the Devonian and Silurian rocks are limestone or dolomite formations, not particularly distinguishable. The Ordovician system consists of the downward succession of the Maquoketa shale formation, the Kimmswick and

Plattin limestone formations, and the St. Peter sandstone formation (see cross-sections).

Mineral Resources

The mineral resources of Kaskaskia Valley comprise coal, petroleum, natural gas, limestone and dolomite, shale, clay, (including underclay), sand and gravel, molding sand, and water. In some respects soil too may be considered a mineral resource.

Of these, coal is probably the most important. *The industries that are based upon these are described elsewhere.*

The coal occurs in beds ranging in thickness from two to seven feet. The most important is that known as coal No. 6, which is mined at many places in a large part of the valley. There are three or four other beds of undetermined extent and stratigraphic position which are locally mined.

Petroleum and natural gas have not as yet been produced in very large quantities in Kaskaskia Valley. However, a total of between six and seven million barrels of crude petroleum have been produced in the area, mainly from small fields in the vicinity of Carlyle, Sandoval, and Centralia in Clinton and Marion counties, and also ^{some} from small fields in the vicinity of Waterloo, Sparta, and Litchfield. The Carlyle, Sandoval, and Centralia fields are still producing, and recently a new field was discovered near Bartelso, also in Clinton County. Commercial amounts of natural gas from bedrock have been produced from small areas within the basin near Sparta and Greenville and just outside the basin near Staunton. At present Greenville is the only town supplied with natural gas produced within the State, the production

coming from a small field near Ayers. Natural gas from glacial drift has been found, when drilling water wells, at a number of places in the upper part of the basin, but it occurs in such limited amounts and so sporadically that it is of no commercial importance, although it has been and is being used for lighting and heating purposes on the farms on which it has been found. Prospects for future production of petroleum and gas in the valley are problematical, but at the present time a serious study of all possibilities is being made by representatives of a number of major oil companies as well as by individual promoters. ^FThe lower Mississippian formations, which occur in the southwest corner of Kaskaskia Valley, represent the only deposits of limestone and dolomite sufficiently extensive to warrant major production of crushed stone, lime, whiting, and similar stone products. The limestone formations in the Chester series and in the Pennsylvanian system are locally of sufficient thickness to warrant local production, especially crushed stone for concrete construction and for agricultural application. Several local quarries have or are being operated in these formations. The future development of large _q as well as more local quarries _q depends on several economic factors as well as availability.

The shale and clay in the Pennsylvanian system and the glacial drift have been and are being utilized, mainly for producing brick at the present time. In former years glacial drift was used extensively also for making drain tile and almost every town had a tile factory to supply local farm demand, but once the farms were fairly well drained the demand ceased and the local factories fell into disuse and most of them are now idle or dismantled. Some pottery, stoneware, and other clay products are being manufactured

from the Pennsylvanian shale and clay formations, and the under-clay formations are being utilized particularly for special types of bricks. The future development of these resources is entirely dependent on future conditions, especially new developments now entirely unknown.

None of the sand and gravel deposits in Kaskaskia Valley are of sufficient magnitude that they warrant production on a major commercial scale. However, in many places they have been and are being exploited for local purposes. The greatest production is being derived from the hill deposits in Clinton, Bond, Fayette, Shelby, and Montgomery counties. Lesser production has been obtained from the minor outwash deposits. In most cases the quality of the gravel is not equal to that of more favorably disposed deposits elsewhere in the State.

Molding sand has been produced in considerable amounts, mostly in Bond County. Due to the special requirements that molding sand must meet, its production is not a matter of mass volume but of selected material in limited amounts and consequently is a peculiarly specialized industry.

Water may be derived either from the formations underground or from surface runoff accumulated in artificial reservoirs. The water supply for nearly all farms in the valley is derived from wells, those in the upper part of the basin being drilled and obtaining water from sand and gravel lenses at moderate depths in the glacial drift and those in the lower part of the basin being generally dug to shallow depth. In the valley of Kaskaskia River itself, sand points driven into the alluvium are used by many

farmers. Many farmers in the lower part of the basin also have constructed small ponds in which surface water collects and serves as the supply for their livestock. Most of the towns and villages in the valley also obtain their water from ^{the} drift or ^{the} alluvium ~~wells~~, but some of them utilize surface reservoirs and this scheme is being considered by more and more municipalities, especially in the lower part of the valley. There are very few water wells in bedrock because the water is too heavily mineralized.

As might be expected, the character and quality of the soil in Kaskaskia Valley reflect to some degree the character of the parent material and the drainage conditions. The soil in the upper part of the basin that is covered by Wisconsin glacial drift is in general much more fertile than the part covered by Illinoian glacial drift. Other things being equal, the areas covered by loess more than two to three feet thick is generally more fertile than those with little or no loess, the fertility to some degree increasing with thickness of loess. Drainage conditions, that is (a) degree of slope, (b) proximity to streams, (3) texture of parent material, etc., also affect the relative fertility of soils in many respects, without considering the fact that unchecked erosion actually removed the soil. The poorest soil in the basin occurs as flat ^{upland} areas covered by Illinoian drift, with little or no mantle of loess.

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MINERAL RESOURCES AND FUTURE POSSIBILITIES
OF THE KASKASKIA VALLEY, ILLINOIS a/

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ILLINOIS STATE
GEOLOGICAL SURVEY

Nature of the mineral resources

The mineral resources of the Kaskaskia Valley are entirely of a non-metallic character, the most important ones being coal, limestone, sand and gravel, clay, and oil and gas. The fact that this area is immediately tributary to the St. Louis industrial area, with its large population and resultant needs, the greater part of the mineral production is for local consumption. Although the demands for coal and limestone in the Kaskaskia Valley are large, the available resources of these two minerals are sufficient to meet the local demand and at the same time permit the producers to profitably ship their products to more distant markets.

Coal

The estimated coal resources in the Kaskaskia Valley at the end of the year 1930 are 25,932,000,000 tons. In Table I are listed the counties studied in this area with their respective estimated resources of coal. Although Washington County is in the Kaskaskia Valley, it was omitted in the study of coal because of its close relation to southern Illinois coal mining rather than to the industry as found in the Kaskaskia Valley.

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- a/ In the preparation of this report, the author has drawn upon the reports of the State Department of Mines and Minerals for statistics of the coal industry.
 - b/ In the preparation of this manuscript, the following members of the Geological Survey staff have cooperated: J. E. Lamar, W. A. Newton, and W. H. Voskuil

Table I

Estimated Coal Resources at the End of 1930, by Counties
(In millions of net tons)

Randolph	714
Menroe	272
St. Clair	3,113
Madison	3,467
Bond	2,637
Clinton	3,280
Fayette	3,858
Shelby	2,796
Moultrie	1,530
Coles	2,379
Douglas	1,886
Total Resources at end of 1930	25,932

There are three types of coal mines, all three of which are in operation in the Kaskaskia Valley. They are:

- (1) Shipping mines
(a) Shaft mines
- (2) (b) Strip mines
- (3) Local mines.

Shipping mines and strip mines are alike in that they both ship to distant markets in addition to their local trade. The difference in the two types lies in their method of mining. The shipping mines are mechanized shaft mines which gain the coal from many feet below the surface. In other words, they are highly mechanized underground mines in which the coal must be brought up to the surface before it can be prepared and loaded for shipping. Strip mining is surface-mining in which the overburden, whether it be soil, sand and gravel, or rock, is removed by large steam or electric shovels. The amount of overburden which can be profitably

taken off depends upon its nature and the thickness and quality of the underlying coal. It also is a highly mechanized type of mining. Local mines are small slope or shallow shaft mines worked mainly by hand which contribute only to the local market.

Shipping mines and strip mines, as contrasted with local mines, are characterized by a high degree of mechanization, greater output per man per day, and greater production. They ship by rail while the local mines transport their coal by truck and wagon.

In Table II are shown a number of factors which have an important relation to the economic conditions of the Kaskaskia Valley as affected by the coal mining industry. The 7,222 men employed in coal mining in the six producing counties of the area in 1930 represents almost 6 per cent of the total male workers in these six counties and 4.70 per cent of the state total employed in this industry.

Table II
Coal Statistics, 1930, by Counties

County	Production (tons)	Value (dollars)	Number Employed	Average number of days worked in year	Average output per man per day (tons)	Male workers employed in all industries
Randolph	444,918	808,000	836	116	4.60	10,366
St. Clair	2,474,182	3,243,000	2,911	139	6.11	50,850
Madison	2,222,604	3,916,000	2,461	139	6.50	45,440
Clinton and Bond	495,552	793,000	866	108	6.17	8,302
Shelby	48,519	123,000	148	133	2.46	7,479
Total	5,685,775	8,883,000	7,222	127	5.17	122,437
1930 State total	53,731,230	93,484,000	53,603	156	6.42	2,467,644
% of State total	10.60	9.52	13.45			

In the year 1930, of the total production of coal in the Kaskaskia Valley, 21.2 per cent was consumed locally of which 7.6 per cent was produced by local mines. In the year 1933, 14.5 per cent of the coal produced in the Valley was consumed locally. Practically all of the coal thus consumed was supplied by the "local" mines. Shipping mines supplied less than three per cent of this market.

The local mine is becoming an important factor in the coal needs of the Kaskaskia Valley and affects the socio-economic problems of this area.

The local mine production percentage of the total all-mine production has had an almost steady rise from 3.3 per cent of the total production in 1924 to 16.2 per cent in 1934 (See Table III). The net tonnage of coal produced by local mines has likewise had a general rise, but in the course of this rise has fluctuated downward in certain years due to the conditions of the bituminous coal industry as a whole and to factors peculiar to local mining. Local mine production was 275,764 tons in 1924 and 801,036 tons in 1934, the largest production to date by local mines in the Kaskaskia Valley. This increase of local mine production ^{occurred during} ~~has accompanied~~ a material decrease in the shipping mine production, from nine million tons in 1924 to about five million tons in 1934.

A study of the figures in Table III showing the local mine percentage of all the coal produced in the Kaskaskia Valley will show that the local mine percentage of the all-mine total

Table III

All Mine Production of Coal in the Kaskaskia Valley,
by Counties from 1924-1934

	Randolph (Net tons)	St. Clair (Net tons)	Madison (Net tons)	Clinton (Net tons)	Shelby (Net tons)	Monroe (Net tons)	Bond (Net tons)	Kaskaskia Total Production (Net tons)	State Total Production (Thousand net tons)	Kaskaskia Per cent of State Total	Kaskaskia Local Mine Prod. (Tons)	Local Mine % of Total Kaskaskia Production
1924	1,152,633	3,545,518	3,273,546	862,615			265,019	9,099,331	68,323	13.3	275,764	3.30
1925	864,620	3,022,506	3,335,344	537,429	70,948		189,150	8,019,997	66,909	12.0	234,644	2.92
1926	1,010,214	3,414,575	3,530,848	800,527	63,036	541	359,153	9,178,894	69,367	13.2	377,767	4.11
1927	652,050	3,114,825	2,260,882	583,079	39,428	553	208,081	6,858,898	46,848	14.7	337,775	4.91
1928	632,677	2,960,126	2,253,835	508,112	29,729	77	114,853	6,499,409	55,948	11.6	319,526	4.90
1929	554,838	2,817,283	2,705,391	542,843	42,591		205,688	6,868,634	60,658	11.3	328,465	4.78
1930	444,918	2,474,182	2,222,604	364,767	48,519		130,825	5,685,815	53,731	10.6	428,522	7.55
1931	468,146	2,769,704	1,149,794	183,507	36,156		52,018	4,659,388	44,303	10.5	469,073	10.05
1932	237,509	2,166,309	990,250	92,895	49,433	4,232	36,549	3,577,177	33,475	10.7	496,490	13.90
1933	392,724	2,407,195	1,304,074	212,224	15,352	505		4,332,074	37,413	11.6	607,975	14.05
1934	477,330	2,508,219	1,616,665	284,250	30,213	444	28,612	4,945,733	38,563	12.8	801,036	16.20

increased in 1926. This was a year of high demand in the bituminous coal industry and this factor, plus the anticipated suspension of union workers April 1, 1927, probably accounts for this increase. Local mine production decreased in 1927, but the percentage continued to rise as a result of the slump in the shipping mine industry caused by suspension of union operation from April to August, 1927. The years 1928 and 1929 saw a revival of the coal industry with a consequent decline of local mine production percentage. With the advent of the depression in 1930, the local mine percentage rose rapidly for the following three years. With the return of the bituminous coal market in 1933, the rise of the local mine percentage became more gradual.

In spite of the increase in production of all mines in 1933 and 1934, the local mine percentage continued to increase rather rapidly. No attempt is made to explain this rise, but further studies of the socio-economic conditions in this area may shed some light on the problem.

In general, it may be said that local coal mining is most favored in depression years and in years when all mine total production is at a low ebb due to suspension of shipping mine operations, decreased consumption, etc.

Employment conditions in the coal industry are analogous to production. In 1924 there were 13,453 employed in coal mining in the Kaskaskia Valley. In 1934 there were 7,040 employed, or a decrease of 52.5 per cent from the 1924 level. This figure is a correlative of the 54.5 per cent decrease in net production from

the 1924 total. Decreased production of the shipping mines caused this slump. In 1924 there were 358 men employed in local mines in this area. In 1934 the total reached its highest peak of 963 men employed, an increase of 37.2 per cent over the 1924 total.

The increase in local mine employment was over twice the increase in local mine production during this eleven year period. This is accounted for by the fact that the output per men per day in the local mines is so much lower in comparison with that of the shipping mines, which dominate total production in the area.

On the average, over four-fifths of the coal used in St. Louis and East St. Louis comes from Central and Southern Illinois. Table IV gives the origin and quantity of railroad shipments into St. Louis and East St. Louis for the years 1930 to 1934. Although these figures do not reveal from which counties in Central and Southern Illinois coal is shipped to the St. Louis area, they do show the large near-by market this area provides. In 1934 almost 18 per cent of the coal produced in Central and Southern Illinois was shipped into the St. Louis and East St. Louis market.

St. Louis and East St. Louis provide a typical Metropolitan coal market, that is, a market typified by a large diversified population with its equally diversified demands as to kind and quality of coal, coupled with similar varied needs of the many industries. Such a market consumes both low and high-grade coal. It is an outlet for unprepared coal from small mines,

Table IV

Origin of Railroad Shipments of Coal to St. Louis and East St. Louis *a*

(This table excludes non-revenue railroad fuel)

	1930	1931	1932	1933	1934
Western Pennsylvania	-	48	102	23	-
Altoona, Somerset- Myersdale & Cumberland Piedmont	2,374	2,235	1,602	2,074	3,331
Fairmont	-	-	52	-	-
Northern & Eastern Ohio	-	-	-	-	-
Southern Ohio	151	-	-	-	-
Kanawha, Logan & Kenova- Thacker	79,399	37,427	41,137	42,586	42,399
New River, Winding Gulf, Pocahontas Tug River	141,813	122,887	73,317	65,644	59,558
N.E. Kentucky & McRoberts Virginia	263,195	268,340	203,585	179,463	177,011
Harlan & Hazard	2,835	6,030	12,366	11,251	6,258
Ex-River Coal	-	-	-	-	-
Northern Illinois	269	-	209	-	96
Central & Southern Illinois	5,167,612	4,095,676	2,883,363	2,360,143	2,939,703
Indiana	58,811	46,708	70,638	60,246	44,528
Western Kentucky	207,518	137,235	426,477	123,562	96,051
Total by years	5,923,977	4,716,586	3,712,900	3,115,134	3,369,118
Central & Southern Illinois per cent of total	87%	86.8%	78%	75.8%	87.2%

a/ Data compiled from Monthly Coal Distribution reports, U.S. Bureau of Mines.

that is, coal which has not been sized or cleaned in any way before delivery. It also is a market for prepared coal of the highest degree, that is, coal which has had most of the impurities removed such as clay and pyrite, coal which is of a definite size (from screenings to lump), and coal which has been cleansed and dedusted. Thus it is that St. Louis and East St. Louis are a significant market for coal from small local mines, from strip mines, and from shipping mines with or without a high degree of mechanization.

St. Louis presents a special problem to the coal industry in that the city administration is demanding a smokeless fuel. This drive for a cleaner city invites competition to coal from fuel oil and natural gas. Natural gas is now available to St. Louis and East St. Louis by pipe-lines from the Monroe field in Louisiana. Refineries in the St. Louis district make fuel oil available to these and adjoining cities. The alternative to liquid or gaseous fuels is a solid fuel which can meet the demand of the city administration for a smokeless fuel. Investigations by the State Geological Survey on the preparation of smokeless briquettes to meet this problem are now under way.

Limestone

Limestone has a wide variety of uses and occurs in abundance in many parts of Illinois, especially the northern, western and southern parts. It is broken into blocks for use as building stone, rip-rap and rubble. When crushed it serves as concrete aggregate, railroad ballast, road metal, and filter

stone. Pulverized or ground limestone provides agricultural limestone, domestic whiting, stock feed, and poultry grit. Limestone of special chemical properties is made into lime, Portland and natural cement and finds extensive use as a flux in the manufacture of steel. In addition, limestone has many other relatively minor uses.

The production of limestone excepting that used for lime and cement, in Illinois during the decade 1925-34 is shown in Fig. A, as is also the production of limestone in the Kaskaskia Valley.

This chart shows that the curve of limestone production of the Kaskaskia Valley closely parallels that of the State as a whole and that there has been an almost continuous increase in the percent of the State's total yearly production which has come from the Valley.

The limestone resources of the Kaskaskia Valley are shown in Fig. B. It is noteworthy that the major limestone resources occur in the lower part of the valley area, especially in those counties bordering Mississippi River. A large and well distributed quarry industry exists in these counties and is capable of supplying the limestone needs of the lower Kaskaskia Valley (Fig. C). Elsewhere in the valley, limestone is not generally abundant although at several places comparatively small quarries are in operation for the production of agricultural limestone and road metal.

As will be shown subsequently the gravel resources of Kaskaskia Valley are limited and crushed stone is, therefore,

important road making material in many places. The needs of the valley can be supplied easily by existing quarries either within the valley itself or in adjacent regions. There is a possibility that small quarries might be established advantageously at some places in the upper part of the valley to serve as sources of road metal for surfacing local roads but the lack of adequate limestone resources makes it unlikely that such developments will progress to large dimensions.

Agricultural limestone is another very important limestone product in Kaskaskia Valley. The importance of this material for correcting soil acidity and promoting plant growth is well recognized. The counties comprising the lower Kaskaskia Valley normally use more agricultural limestone than any other similar area in the State and the amount of agricultural limestone used in the Valley as a whole comprises a substantial part of the State total production. Table V gives data on this matter, as well as the tonnage of agricultural limestone used by each of the Kaskaskia Valley counties from 1930-1934 and the consumption per acre of arable land.

Table V

Tonnage of Agriculture Limestone Used in the
Kaskaskia Valley, by Counties, 1930-1934

County	1930	Lbs. per acre Arable land	1931	Lbs. per acre Arable land	1932	Lbs. per acre Arable land	1933	Lbs. per acre Arable land	1934	Lbs. per acre Arable land
Randolph	29,200	297	9,076	92	11,123	113	13,248	134	16,521	168
Monroe	29,800	464	8,790	137	6,396	99	10,910	170	16,521	257
St. Clair	30,500	250	9,280	76	7,459	61	16,884	138	6,362	52
Madison	29,300	220	14,817	111	11,594	87	14,143	105	15,364	106
Bond	10,400	164	2,831	45	1,441	18	941	15	1,769	20
Clinton	13,700	146	4,449	54	11,304	120	5,114	58	7,937	84
Fayette	7,000	60	2,511	21	961	8	596	6	1,079	9
Shelby	4,200	29	2,014	14	593	4	1,552	12	1,420	10
Moultrie	1,400	18	771	10	0	0	456	6	449	6
Coles	4,900	47	1,131	9	545	5	519	5	1,532	14
Douglas	3,400	33	750	9	563	5	657	6	2,177	21
Washington	19,800	185	6,964	67	5,339	50	16,485	154	11,852	101
Total	183,600		62,384		57,318		81,505		82,983	
State Total	811,000		266,886		132,995		190,963		346,141	
Kaskaskia per cent of State Total	22.6		23.4		43.1		42.7		23.9	

Only six counties in the Kaskaskia Valley produced agricultural limestone in 1934, namely Randolph, St. Clair, Madison, Monroe, Clinton, and Washington. The first three counties produced more agricultural limestone than they consumed, the other three less. The present demand for agricultural limestone in nine of the twelve counties of the Kaskaskia Valley is supplied therefore in whole or in part by imports from other counties in the valley probably with additional imports from counties outside the Valley.

There has been much interest of late in the development of small quarries to supply local demands for agricultural limestone. Whether or not this can be done profitably depends on a large number of different factors which are variable for different areas and types of limestone deposits. There are a considerable number of these local quarries in the Kaskaskia Valley. The possibility for further development along this line so far as limestone resources is concerned is indicated in Fig. B.

Gravel and Sand

The major part of the structural sand and gravel produced in the Kaskaskia River Valley region is pumped from Mississippi River in Madison, St. Clair, and Randolph counties. However, the valley itself contains deposits of gravel and sand which are exploited in a comparatively small way for material for structural purposes and for road metal. As a rule, the deposits in the valley are comparatively small and though usually not suitable for large scale commercial development are sufficiently numerous to be a valuable source of material for surfacing many secondary roads. These roads contribute greatly to the agricultural efficiency and marketing economy of the areas they serve. Fine grained sand and fine gravel is found along the Kaskaskia Valley bottom and on terraces along sides of the valley. Sand and gravel are also found on some of the hilltops of northern Clinton and western Fayette County, as well as in Bond, Montgomery, and Shelby counties. The sand and gravel in many of

the Kaskaskia Valley deposits is more or less cemented so that crushing is necessary to prepare the material for use. The production of structural sand and gravel in the Kaskaskia River Valley region during the years 1925 to 1934 is given in Fig. D. The geographic distribution of the industry is shown in Fig. E.

Natural bonded molding sand is known in seven Kaskaskia Valley counties, namely Bond, Fayette, Shelby, Clinton, Madison, St. Clair, and Randolph. Commercial production of molding sand has been reported during the period 1925 to 1934 from Bond, Clinton, Fayette, and Madison counties (Fig. E.). Bond County is the largest and most consistent producer. In Bond, Clinton, and Fayette counties the molding sand occurs on the tops of hills and ridges and varies from about 8 to 15 feet thick. It is used by foundries in various parts of Illinois chiefly for making molds for heavy gray iron castings. The molding sand of Madison County is sold for light gray iron, brass, and aluminum molding and is obtained from deposits on the slope of the east valley wall of Mississippi River.

The amount and value of the natural bonded molding sand produced in the Kaskaskia River Valley region in the decade 1925 to 1934 is shown in Fig. F. Locations of pits reporting production in the period 1930 to 1934 is indicated in Fig. E.

Clay and Shale

The raw materials available in Kaskaskia Valley for making clay products include bedrock clay and shale of Coal Measures age

and surface clay. The former are used for making common, face and paving brick, floor, fireplace and wall tile, drain tile, hollow block and tile, flue lining, and sewer pipe. The surface clays are of two types, a gritty brown clay and a pebbly gray or brown clay. The gritty clay occurs mainly on the upland tracts and is used for making common brick. In those areas where other materials are lacking the pebbly clay could probably be employed for making common brick although its use would involve special processing to remove the pebbles.

The clay products plants already in existence in the Kaskaskia River Valley area (Fig. G) and in regions adjacent to it have ample capacity to supply the normal demands of the Valley for structural clay products such as brick, hollow tile and drain tile. The local market is the major outlet for most of the Kaskaskia Valley clay products plants although a number of them reach markets at a considerable distance. It is doubtful if the erection of other sizable plants in the Valley would prove a profitable venture unless there existed a combination of unusually favorable conditions, including an available market, a readily workable clay or shale deposit of superior quality, well located with reference to transportation, and low financing costs.

Fig. H presents a picture of the building trend in St. Louis and East St. Louis from 1920 to 1924. The notable decrease in the amount of construction as indicated by the value of the building permits issued since 1925 has resulted in^a curtailment of structural clay products production. However, it now appears

likely that an increase in production may be expected in the near future as a result of material requirements for delayed repairs and for more adequate housing. Probably there will be an increase in the amount of brick used as compared to wood due to the increasing scarcity of timber supplies near this area.

Oil and Gas

In 1934 there were three producing oil fields in the Kaskaskia Valley. Named in order of the largest daily average production in November, 1934, they are, the Dupo field in St. Clair County, the Carlyle field in Clinton County, and the Wamac field in Marion, Clinton, and Washington counties. (See Table VI).

Table VI

Known Oil Production in the Kaskaskia River Valley ^{2/}

Field	County	Age in years to end of 1934	Production to end of 1934 (bbls.)	Daily average during November, 1934 (bbls.)
Carlyle	Clinton	23	3,226,000 ±	75
Dupo	St. Clair	6	773,000	93
Waterloo	Monroe	Abd.	166,000	0
Wamac	Marion, Clinton, Washington			
Collinsville	Madison	13 Abd.	25,000 ± 715	68 ± 0
Total			4,190,715	236

The Waterloo field in Monroe County, the Frogtown pool in Clinton, and the Collinsville field in Madison County were at one time oil producers but now abandoned. The Westfield pool in

the southeast corner of Coles County (the larger part being in Clark County) is yet a small oil producer, the exact figures not being known.

The Ayers gas-field in Bond County is the only present gas-producer, its production being only large enough to supply the near-by town of Greenville.

Fig. I shows the present producing oil and gas fields in the Kaskaskia River Valley area.

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