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SAND AND GRAVEL RESOURCES OF PEORIA COUNTY

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ABSTRACT

The sand and gravel deposits of Peoria County are largely the direct or indirect result of glacial processes. These deposits consist of glacial outwash of Illinoian and Wisconsinan age, slackwater sediments, sand dunes, and postglacial stream alluvium. Glacial outwash is the most important source of sand and gravel.

Although Peoria County has large amounts of high quality sand and gravel, it is almost entirely restricted to areas within and adjacent to the valleys of the major streams—the Illinois River and Kickapoo Creek. The western and southwestern parts of the county, the area of the Illinoian till plain, are deficient in sand and gravel.

The city of Peoria and its environs cover extensive sand and gravel deposits that are generally unavailable for commercial exploitation.

INTRODUCTION

Purpose of Study

Rapid growth of metropolitan areas and continued expansion and improvement of the Illinois highway network require increasing quantities of sand and gravel for construction of all kinds. Recognizing the need for information regarding the distribution of sand and gravel, the Illinois State Geological Survey is engaged in a program designed to evaluate, or in places reevaluate, the sand and gravel resources of the state (fig. 1). This report is a part of that program.

The city of Peoria and its environs cover extensive sand and gravel deposits that are unavailable for commercial exploitation. For this reason, the resources remaining become increasingly important as reserves of sand and gravel to supply the needs of the greater Peoria area. This report indicates possibilities for future areas of production and thus will be helpful in the preservation of potential sources of sand and gravel for future use.

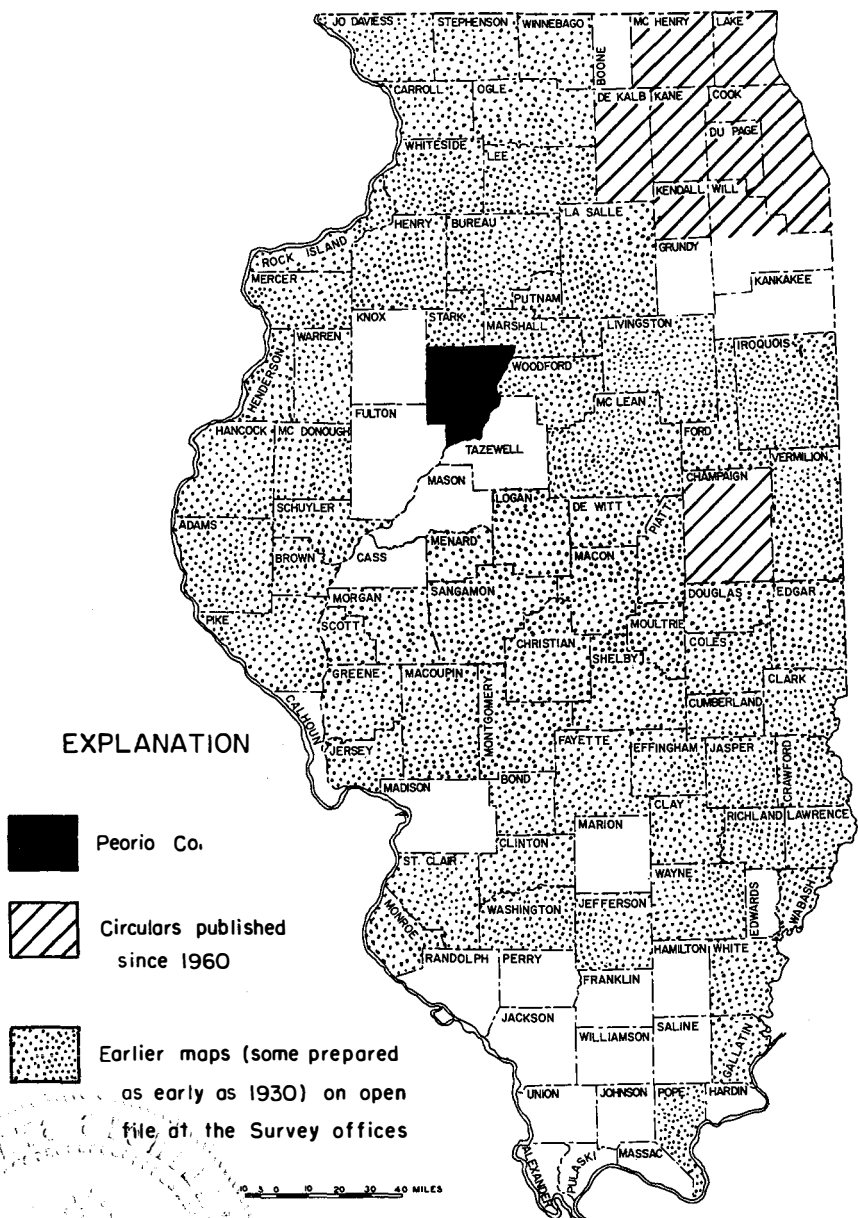


Figure 1 - Index map showing Peoria County and other areas where sand and gravel resources have been mapped in Illinois.

Previous Investigations

The geologic setting of Peoria County was first discussed by Worthen (1873). Leverett (1899) first described the surficial geology in his monograph on the Illinois glacial lobe. The geography of the middle Illinois Valley, including the Peoria region, is covered by Barrows (1910). Udden (1912) commented briefly on the sand and gravel deposits in the Peoria Quadrangle and Willman (1942) tabulated and discussed the mechanical and mineralogical composition of some of the sands in Peoria County as a part of a statewide study of feldspar in Illinois sands. The water-yielding potential of the sand and gravel of Peoria County and surrounding areas was considered by Horberg et al. (1950). The geology and mineral resources of that part of Peoria County lying within the Glasford Quadrangle have been described by Wanless (1957). The mineral resources of the Illinois Waterway were described by Lamar et al. (1935) in an unpublished report, which is on open file at the Illinois State Geological Survey. Another unpublished report, made in 1930 by H. A. Sellin under the direction of George E. Ekblaw, discusses road material resources, including the sand and gravel, of Peoria County.

TYPES OF DEPOSITS

General Statement

Most of the surface materials in Peoria County are the direct or indirect result of glacial activity during the Pleistocene Epoch, or the Ice Age. They include glacial till and glacial outwash, collectively referred to as "glacial drift." These deposits are widely covered by wind-deposited silt (loess). In many places along the Illinois River and its tributaries, postglacial stream erosion has removed the glacial deposits and has exposed the underlying coal-bearing bedrock of Pennsylvanian age.

The sand and gravel deposits of Peoria County are almost exclusively of glacial origin, and represent several distinct episodes of gravel deposition. Their distribution and character have been determined by advances and retreats of the glacial ice and by the sorting action of the glacial meltwater. Therefore, an understanding of the major features and events of the glacial history of the county is necessary in order to evaluate the sand and gravel resources. To this end, this investigation has involved (1) study of the configuration of the land to determine the significance of various landforms as possible sources of sand and gravel, (2) field examination of the materials in natural and man-made exposures and in shallow hand-auger borings, and (3) study of the logs of wells as sources of more specific resource data.

Peoria County was invaded by glacial ice during each of the four major glacial stages that have been recognized in North America, but only the third and fourth stages, termed the Illinoian and Wisconsinan respectively, are widely exposed in Peoria County. Deposits left by the older glaciations, the Nebraskan and Kansan, are known in Peoria County only from wells and from very small and scattered outcrops along valley walls. Figure 2 shows the distribution of Illinoian and Wisconsinan deposits within the county as well as the major glacial features of the surrounding region. Exposures and well data show that the Illinoian deposits probably underlie

the Wisconsinan deposits in most places in Peoria County. In general, the older Illinoian sands and gravels have a thicker overburden and are more deeply weathered than the Wisconsinan materials.

Both the Illinoian and Wisconsinan deposits consist largely of glacial till and glacial outwash. These deposits are covered with a layer of wind-laid silt (loess) except in the valley flat of the Illinois River. In addition, slackwater deposits of Wisconsinan age occur along tributaries of the Illinois River, and sand dunes occur in some areas of glacial outwash. Postglacial stream alluvium is found in the bottom lands of most of the valleys.

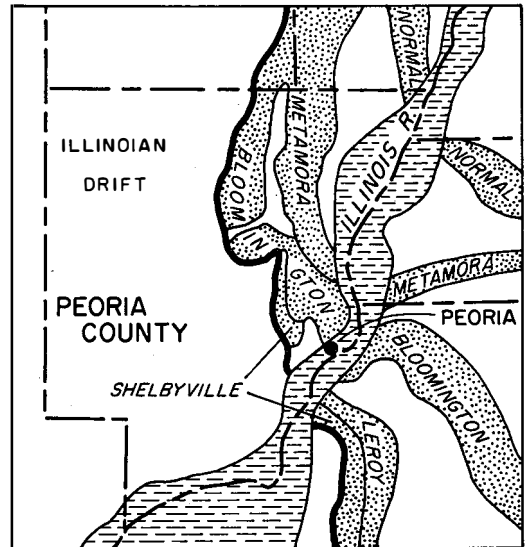
Glacial Till

The mixture of earth materials deposited directly by a glacier when it melts is called till. The till of Peoria County is principally clay, but it also contains coarser materials including boulders. It is not bedded and has a blocky or platy structure, especially when crumbled between the fingers. The materials comprising the Illinoian and Wisconsinan tills were picked up by the glacier from areas to the north and northeast.

When the forward movement of a glacier is balanced by melting, the margin of the glacier remains approximately stationary, and the earth materials dropped from the melting ice accumulate in a ridge termed an end moraine. Such moraines generally are composed of till but sand and gravel occur in some places. Numerous knolls and depressions are usually characteristic.

When the glacial front retreats at a generally uniform rate, a relatively flat undulatory sheet of till is deposited that is called a ground moraine.

No end moraines are found within the Illinoian till plain in Peoria County (pl. 1). Apparently, the glacier front retreated too uniformly to build a moraine. By contrast, the area of Wisconsinan drift is almost completely occupied by broadly parallel, generally north-south trending end moraines. Each end moraine is younger than its neighbor to the west, each extends well beyond the limits of Peoria County, and each is named after a city or town built upon it (pl. 1). End moraines are important in locating sand and gravel deposits because they determine, to a large extent, where sand and gravel may be expected to occur.



EXPLANATION

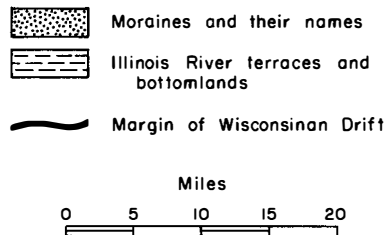


Figure 2 - Map of glacial deposits in Peoria County and environs.

Glacial Outwash

The term outwash is applied to those earth materials that were freed from the glacial ice when it melted and were transported and deposited by streams of meltwater. In the process, the original load of the glacial ice was sorted by the moving water into deposits having a generally uniform particle size. The coarsest and most poorly sorted deposits are often found near the end moraine where the water flowed the fastest. In general, progressively finer and better sorted material is encountered farther from the ice sheet. The coarsest materials of an outwash deposit usually are found in the basal part of the deposit.

In Peoria County, outwash occurs in broad plains bordering end moraines and in valley trains confined within the walls of valleys leading away from the glacier. The valley trains originally filled the valleys up to a certain level from wall to wall, but later stream erosion removed large parts of the filling, leaving flat-surfaced remnants as terraces along the streams. Outwash deposits, particularly those occurring as terraces along the Illinois Valley, are the most important sources of sand and gravel in Peoria County.

Slackwater Deposits

During the time the Wisconsin glacier was retreating northeastward from its maximum southern and western positions in Peoria County, marked by the Shelbyville Moraine, the Illinois Valley served as an important discharge way for glacial meltwater and at times was clogged by large amounts of outwash. As a result, water backed up into the tributary valleys, forming long, narrow, generally short-lived lakes. Sediment was washed into these slackwater lakes from farther upstream, from adjacent valley sides, and from the Illinois Valley itself. After the Illinois Valley had discharged its excess meltwater, and after parts of the valley had been cleared of outwash sediments, the lakes in the tributaries drained and stream flow was restored. Since that time, the slackwater deposits have been eroded by the streams in the valleys, and they now remain only as isolated terraces along the valley walls.

Because they were deposited by feeble currents, the slackwater materials are fine-grained, mostly silt and clay. In places, fine sand and small amounts of gravel are found in these deposits, but no large amounts of coarse-grained material occur.

Sand Dunes

Sand dunes consist of well-sorted, medium to fine sand deposited by the wind. In Peoria County they are restricted to areas of sandy outwash occurring as valley train terraces within the Illinois Valley.

Alluvium

Alluvium is the material deposited by streams in the bottoms of their valleys after the withdrawal of the glaciers. It consists mostly of silt and clay, but may contain coarser materials. In places it may cover coarse outwash of glacial origin.

Loess

Loess is wind-deposited silt. It covers all of the upland areas of Peoria County and ranges from 5 feet to more than 20 feet in thickness. The source of the silt was the finer sediments of the Wisconsinan outwash in the Illinois Valley. Hence, the loess tends to be thickest on the uplands adjoining the Illinois Valley. In addition, the loess is thicker over most of the Illinoian till plain than it is on the Wisconsinan drift. It is usually 15 to 20 feet thick on the Illinoian drift and less than 10 feet thick on the Wisconsinan drift. It constitutes at least a part of the overburden on all of the upland sand and gravel deposits.

DISTRIBUTION OF SAND AND GRAVEL

The sand and gravel resources of Peoria County are discussed in order of age, beginning with the oldest deposits. In the legend on plate 1, the resources map, the various patterns that indicate resources are arranged from top to bottom in order of probable importance. Since the age of a deposit does not necessarily correspond with its commercial importance, the patterns on the map have been numbered and the numbers are given as a means of correlating the resource descriptions with the map.

Locations of deposits sampled and results of sieve tests and pebble counts are shown in tables 1, 2, and 3 respectively.

TABLE 1 - LOCATION OF SAND AND GRAVEL SAMPLES FROM PEORIA COUNTY

Sample Number	Location						Thickness Sampled (feet)	Source	Kind of Deposit
	1/4	1/4	1/4	Sec.	T.	R.			
1	SE	NW	SE	17	11 N.	9 E.	8	Gravel pit	High terrace along Illinois River
2	NE	SW	NE	12	11 N.	6 E.	7	Gravel pit	Buried Illinoian outwash
3	SW	SE	SE	30	10 N.	7 E.	7	Gravel pit	Upland outwash
4	SE	SE	SW	34	10 N.	6 E.	6	Gravel pit	Upland outwash
5	SW	SW	SE	33	10 N.	6 E.	9	Gravel pit	Buried Illinoian outwash
6	NW	SE	NE	5	9 N.	6 E.	6	Gravel pit	Buried Illinoian outwash
7	SW	SE	SE	7	9 N.	5 E.	6	Gravel pit	Illinois outwash
8	SW	SW	SW	15	7 N.	7 E.	7	Gravel pit	High terrace along Illinois River
9	NW	SW	NE	6	8 N.	8 E.	6	Gravel pit	Buried Shelbyville outwash (upper gravel)
10	NW	SW	NE	6	8 N.	8 E.	5	Gravel pit	Buried Shelbyville outwash (lower sand)
11	NW	SW	NE	35	9 N.	7 E.	Bank run	Gravel pit	Upland outwash

Older Outwash (Illinoian)

Buried Illinoian Sand and Gravel

(Map pattern 6) Beds of sand and gravel enclosed within Illinoian till were found in many places. However, in most places these beds are under 10 feet thick. Because of their thinness and the overburden of till, most of these deposits are of doubtful present commercial value. Along the West Fork of Kickapoo Creek and in an area north of Princeville, on the other hand, sand and gravel deposits below Illinoian till are thick enough to be mapped and have been exploited for their sand and gravel.

In the area north of Princeville, a pit near the center of sec. 12, T. 11 N., R. 6 E. exposes 20 feet of gravel below silt and till overburden. The overburden increases in thickness as the elevation of the land increases and as much as 24 feet of overburden is present at one point in the pit face. The lower few feet of the exposed sand and gravel contain many boulders, but the actual base of the sand and gravel was not exposed. The size distribution of the sand and gravel and a pebble count of the gravels, excluding the basal boulder bed, are shown in tables 2 and 3 (sample 2).

TABLE 2 - SCREEN ANALYSES¹
(Percent retained)

Sieve	Sample Number											
	1	2	3	4	5	6	7	8	9	10	11	
2½ inch	8.8	3.2		12.0								
2 inch	2.8	0.0	0.6	2.5	1.0		0.8	1.0	0.7		2.6	
1½ inch	8.1	2.8	2.6	6.8	0.0	1.7	3.0	3.2	0.3		0.7	
1 inch	8.6	6.6	6.9	6.9	2.7	1.7	4.2	6.2	1.1		1.9	
¾ inch	10.3	8.9	9.9	6.0	3.1	3.4	4.4	9.9	2.0		1.9	
½ inch	8.6	6.6	6.9	3.1	3.8	3.3	5.6	7.7	2.6		3.0	
3/8 inch	10.9	8.1	7.4	3.0	5.8	5.2	10.3	11.8	3.9		4.7	
4 mesh	16.7	13.8	11.6	5.0	8.6	13.4	21.5	25.3	10.7		11.8	
6 mesh	12.5	10.4	13.5	9.1	16.4	4.6	15.6	10.6	11.1	0.1	21.4	
8 mesh	6.9	9.5	11.5	8.3	17.3	5.6	11.4	9.6	12.1	0.1	17.8	
10 mesh	2.9	7.2	8.0	7.4	12.1	7.3	8.0	6.6	10.8	0.1	12.7	
14 mesh	1.0	5.1	5.8	6.2	7.1	8.1	4.7	3.4	8.7	0.1	8.1	
20 mesh	0.4	3.4	4.0	5.2	4.4	6.8	2.5	1.7	7.0	0.2	4.3	
28 mesh	0.3	2.9	3.8	5.8	5.0	7.7	1.6	1.1	7.7	1.2	2.5	
35 mesh	0.2	2.1	2.4	3.7	4.0	6.4	0.7	0.4	7.2	5.5	1.1	
48 mesh	0.5	1.5	1.9	2.2	2.9	7.1	0.4	0.2	8.3	13.2	0.8	
65 mesh	0.2	0.6	0.9	0.9	0.9	5.4	0.3	0.1	2.7	28.1	0.4	
100 mesh	0.1	0.4	0.5	0.4	0.4	4.6	0.2	0.1	0.6	35.2	0.1	
150 mesh	0.1	0.4	0.3	0.5	0.5	2.8	0.2	0.1	0.2	10.6	0.4	
200 mesh	0.1	0.3	0.1	0.3	0.4	0.9	0.2	0.1	0.1	2.7	0.2	
270 mesh	0.0	0.3	0.1	0.3	0.5	0.6	0.2	0.1	0.1	1.0	0.2	
Pan	0.5	6.4	1.4	4.4	3.5	3.4	4.2	0.8	2.2	1.8	3.3	
Total	100.5	100.5	100.1	100.0	100.4	100.0	100.0	100.0	100.1	99.9	99.9	
+ 1 inch	28.3	12.6	10.1	28.2	3.7	3.4	8.0	10.4	2.1		5.2	
+ 4 mesh	74.8	50.0	45.9	45.3	25.0	28.7	49.8	65.1	21.3		26.6	
- 4 mesh	25.7	50.5	54.2	54.7	75.4	71.3	50.2	34.9	78.8	99.9	73.3	

¹ Sieve tests by Fred D. Busche - July, 1964.

Sand and gravel below silt and Illinoian till is exposed in many places along the West Fork of Kickapoo Creek. No pits were operating at the time of this study, but idle or abandoned pits are present in the NE $\frac{1}{4}$ sec. 12, T. 9 N., R. 5 E.; N $\frac{1}{2}$ sec. 5; NW $\frac{1}{4}$ sec. 4, T. 9 N., R. 6 E.; and SE $\frac{1}{4}$ sec. 33, T. 10 N., R. 6 E. The sand and gravel crops out along the valley sides; but where the pits have been cut into the hillsides, the sand and gravel is overlain by at least 15 to 25 feet of till and silt overburden. The thickness of overburden undoubtedly increases farther back from the valley walls. These deposits appear to be related to a buried bedrock valley which parallels West Fork of Kickapoo Creek and lies about one mile south of the north line of Tps. 9 N., 5 and 6 E. (Horberg et al., 1950, pl. 1). Illinoian outwash gravel may occur beneath a cover of Illinoian till throughout the length of this buried valley, but the thickness of the overburden may be excessive. The sand and gravel exposed in the various pits ranges from 15 to 30 feet thick; the base of the sand and gravel was not seen. In the pit in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 33, T. 10 N., R. 6 E., however, till lenses occur in the lower part of the gravel. The grain size distributions and pebble counts of two samples from this area are shown in tables 2 and 3 (samples 5 and 6).

Surface Deposits of Illinoian Sand and Gravel

(Map pattern 4) Sand and gravel deposits of Illinoian age covered by less than 10 feet of loess occur in several places. The major occurrence of these deposits is around Elmwood, where idle or abandoned sand and gravel pits in loess were found in the S $\frac{1}{2}$ sec. 7; SE $\frac{1}{4}$ sec. 8; and S $\frac{1}{2}$ sec. 10, T. 9 N., R. 5 E. The best exposures were in the pits in the S $\frac{1}{2}$ sec. 7, where the sand and gravel is at least 10 feet thick, with the base not exposed, and the silt overburden is no more than 5 feet thick. The exposures in sec. 10 are on valley sides, and these deposits may be overlain by Illinoian till to the north away from the valley. The grain size distribution and a pebble count of the material in the pit in the SE $\frac{1}{4}$ sec. 7 is shown in tables 2 and 3 (sample 7). Ledges of cemented gravel are common in the pit in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7.

Near the mouth of the West Fork of Kickapoo Creek, in the SW $\frac{1}{4}$ sec. 3 and SE $\frac{1}{4}$ sec. 4, T. 9 N., R. 6 E., a surface deposit of Illinoian sand and gravel is exposed in abandoned sand and gravel pits. These exposures are on a valley side, and it is possible that they are overlain by Illinoian till farther away from the valley. The sand and gravel is 20 feet thick and overlies till.

A thin layer of sand covers much of the bedrock hill 3 miles northeast of Princeville, chiefly in secs. 4, 7, 8, and 9, T. 11 N., R. 7 W. It is thought to be Illinoian in age, although it may be a wind-laid deposit of Wisconsinan age. The sand exposed in the walls of a quarry in the area is very fine- to medium-grained, 5 to 10 feet thick, directly overlies limestone bedrock, and is overlain by about 2 feet of silty soil.

Younger Outwash (Wisconsinan)

Upland Sand and Gravel

(Map pattern 2) There are two areas of upland sand and gravel in Peoria County, one along Kickapoo Creek and the other at Peoria. Along Kickapoo Creek, the deposits occur on the uplands and as upland high terraces. They extend downstream from the vicinity of Dunlap (pl. 1). These deposits lie along the border of the Bloomington Moraine both north of Kickapoo in secs. 29 and 32, T. 10 N., R. 7 E. and at Peoria; they represent outwash from the glacier that built the Bloomington Moraine.

TABLE 3 - PEBBLE COUNTS OF GRAVEL SAMPLES
(Percent by number of pebbles)*

Sample No.	1		2		3		4		5		6		7		8		9		11		
Size inches	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4	1/2	
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	1/2	3/8	
Dolomite	58	57	24	15	70	58	31	30	29	33	24	31	43	38	56	73	45	46	24	28	
Limestone	18	13	52	57	8	9	43	26	31	28	22	23	18	18	15	6	17	14	14	18	
Chert	12	9	8	5	5	10	8	13	20	18	15	14	18	18	7	6	17	8	9	8	
Shale		1	1	2	1				1	2	1		2				3	10		T	
Sandstone and Siltstone	1	2	4	6	4	1	8	4	4	5	3	9	6	6	1	1	8	13	5	6	
Ironstone concretions		1	1	3					1	1	2	2	4	2	1		1			T	
Dark-colored igneous	5	7	3	4	6	7	4	2	2	4	2	1	2	6	4	3	2	2	2	1	
Granitic	2	2	2	1	1	5	1	1	2	2	3	3	2	3	8	4	3	4	1	3	
Rhyolite		1		1		2	1		3	1	1	2	1		2	1		1			
Quartz		1	1	2			1	2		3	3	3	1	4		3		1		T	
Quartzite	2	2	1	1	1			1	4	2	2	2	1	4		1	2	1	1	1	
Gneiss		3	1				1	2	1			T	1	1	1					T	
Schist		1			1					1						1				T	
Graywacke	2		1	2	2	3		2	2	1	5	3	1	1	3		1		1	1	
Cemented gravel					1	5					15	8	3	1						43	34
Clay balls			1	1			6	14													
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

SAND AND GRAVEL RESOURCES OF PEORIA COUNTY

*T = less than 1 percent

The deposits north of the village of Kickapoo, northwest of Peoria, occur in a broad upland tract centered approximately in the NE $\frac{1}{4}$ sec. 31, T. 10 N., R. 7 E.; in a number of small areas along Kickapoo Creek extending upstream to sec. 15, T. 10 N., R. 7 E., one mile south of Dunlap; and downstream to the NW $\frac{1}{4}$ sec. 11, T. 9 N., R. 6 E., just below the junction with the West Fork. The elevation of these deposits decreases progressively from northeast to southwest.

The material comprising the deposits is exposed in a number of road cuts and gravel pits and ranges from medium sand to coarse gravel. Sand predominates in many places, as in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 31, T. 10 N., R. 7 E., but on the whole, the material is a sandy, fine gravel. Sample 3 (table 2) was taken from a pit in the SE $\frac{1}{4}$ sec. 30, T. 10 N., R. 7 E. The thickest and coarsest material in this area probably is to be found along Kickapoo Creek from the SW $\frac{1}{4}$ sec. 29, T. 10 N., R. 7 E., to the NW $\frac{1}{4}$ sec. 3, T. 9 N., R. 6 E. Because the bedrock is high along Fargo Run in the NE $\frac{1}{4}$ sec. 5, T. 9 N., R. 7 E., in the SW $\frac{1}{4}$ sec. 31, T. 10 N., R. 7 E., and probably throughout the S $\frac{1}{2}$ secs. 31 and 32, T. 10 N., R. 7 E., the deposits are less than 10 feet thick in these areas. Glacial till occurs beneath about 10 feet of sand along the highway in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 36, T. 10 N., R. 6 E. The small patches of outwash along Illinois 91 south of Dunlap (sec. 15, T. 10 N., R. 7 E.) and about one mile to the southwest (sec. 22, T. 10 N., R. 7 E.) consist of less than 10 feet of sand and fine, sandy gravel. The same is true for the small remnants of this material found in the NW $\frac{1}{4}$ sec. 11, T. 9 N., R. 6 E.

Upland sand and gravel deposits are found in and near Peoria on the prominent high terrace in the northwestern part of the city, and extend northward along Dry Run to secs. 29 and 30, T. 9 N., R. 8 E. In addition, similar deposits occur on the bluffs south of Kickapoo Creek in sec. 35, T. 9 N., R. 7 E., opposite the mouth of Big Hollow Creek, and in small areas along the west bluff of Kickapoo Creek in secs. 1 and 12, T. 8 N., R. 7 E., where they rest on bedrock. An area in the SE $\frac{1}{4}$ sec. 27, T. 9 N., R. 7 E. is also thought to contain sand and gravel, though none was actually seen.

The upland deposits range from less than 10 feet thick in places along Dry Run to 20 feet or more in the terrace in the west part of Peoria, and to more than 40 feet thick in the area opposite the mouth of Big Hollow Creek. The material is mostly sandy, fine gravel, but beds of sand and coarse gravel are common. Till balls were observed in a pit along Interstate 74 in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 9 N., R. 8 E., and till is closely associated with the gravel, particularly near its base, in the abandoned pits in the SE $\frac{1}{4}$ sec. 1, T. 8 N., R. 7 E. Ledges of cemented gravel are common in the pits in sec. 35, T. 9 N., R. 7 E., and also in the southern part of the abandoned pit in SE $\frac{1}{4}$ sec. 1, T. 8 N., R. 7 E. The cemented gravel is broken into manageable sizes by a wrecking ball and is crushed before the material is sent through the normal processing procedures. Samples 3, 4, and 11 (tables 2, 3) represent the grain size distribution and pebble counts of these deposits.

Overburden on the upland sands and gravels consists of silt generally ranging from 5 to 10 feet in thickness.

Sand and Gravel Cropping Out Beneath Glacial Till in Valley Bluffs

(Map pattern 5) Sand and gravel crops out beneath glacial till along the bluffs of Kickapoo Creek and its southwest flowing tributaries from the NE $\frac{1}{4}$ sec. 26, T. 9 N., R. 7 E., to the NE $\frac{1}{4}$ sec. 12, T. 8 N., R. 7 E. Its limits to the north, east, and south are unknown, but it is probably confined to the bedrock valley of Kickapoo Creek (Horberg et al., 1950, pl. 1). Because this sand and gravel lies directly beneath till of the Shelbyville Moraine, it is considered to be Shelbyville outwash overridden by the Shelbyville glacier.

The lower portion of the deposits consists of a medium-grained, well-sorted sand which can be observed in pits and road cuts in the NE $\frac{1}{4}$ sec. 6, T. 8 N., R. 8 E.; NE $\frac{1}{4}$ and cen. sec. 1, T. 8 N., R. 7 E.; SE $\frac{1}{4}$ and NE $\frac{1}{4}$ sec. 26, T. 9 N., R. 7 E. The sand exceeds 20 feet in thickness in several of these exposures.

Lying above this sand are beds of fine to coarse, sandy gravel with some beds of coarse sand. Although not as uniformly thick as the underlying sand, this gravel has the same distribution as the sand. Observed thicknesses range from 3 to 15 feet. In the gravel pit in the NE $\frac{1}{4}$ sec. 6, T. 8 N., R. 8 E., several large, well-cemented ledges of gravel occur. Sample 10 (table 2) represents the size distribution of the lower sand in this pit, and sample 9 (tables 2, 3) represents the size distribution and pebble count of the upper gravel.

The availability of the deposits described above is restricted because the overburden becomes thick a short distance back from the bluffs in which the deposits crop out.

High terrace along the Illinois Valley

(Map pattern 1) A deposit of glacial outwash was laid down in the Illinois Valley during the building of several of the Wisconsin moraines. This deposit was later eroded by meltwater discharged through the valley that left only remnants of the original deposit as terraces at several levels above the floor of the valley. The higher of the two terraces recognized in Peoria County lies at an elevation of about 520 feet and is related to one of the later floods that flowed down the Illinois Valley.

The most extensive area of high terrace in Peoria County extends from Senachwine Creek, north of Chillicothe, southward for about 9 miles, to the point where Dickison Run enters the Illinois Valley, two miles north of Mossville (pl. 1). Its maximum width approaches 4 miles about mid-way along its length. This is the largest area of sand and gravel in the county.

Most of Peoria is built on another remnant of the high terrace. This is a wedge-shaped area, narrow at its northeast end (center of the south line sec. 26, T. 9 N., R. 8 E.), but widening to about one mile at its southwest end at Kickapoo Creek (pl. 1). A small area of high terrace also occurs west of Lamarsh Creek at the point where the creek joins the Illinois Valley and lies mostly in the NE $\frac{1}{4}$ sec. 21, T. 7 N., R. 7 E., about 1 $\frac{1}{2}$ miles northeast of Mapleton.

The materials comprising the high terrace deposits range in size from medium sand to coarse gravel, with scattered cobbles and boulders. In general, the gravel becomes finer downstream from northeast to southwest. The coarsest materials are found near Chillicothe (sample 1, table 2), but large deposits of sand are found in this area also. Abandoned pits in the high terrace in the western part of Peoria (cen. and SE $\frac{1}{4}$ sec. 13, T. 8 N., R. 7 E.) expose fine to medium, sandy gravel and a large amount of medium sand. A pit in the southwesternmost remnant of high terrace, two miles northeast of Mapleton (SW cor. sec. 15, T. 7 N., R. 7 E.), is working fine, sandy gravel (sample 8, table 2). Ledges of cemented gravel occur both in the high terrace deposits at Chillicothe and at Peoria. Pebble counts of samples 1 and 8 are given in table 3.

The thicknesses of the high terrace deposits are known to exceed 40 feet north of Chillicothe and 30 feet at Peoria. These thicknesses are probably greater than 30 feet throughout both areas, and in places exceed 100 feet. The northern part of the terrace remnant northeast of Mapleton rests on bedrock at a depth of 20 feet or less. In the gravel pit near the east end of this terrace, 20 to 30 feet of gravel is being worked. This is probably close to the maximum thickness of this deposit.

Overburden of the high terrace deposits is silt, usually less than 5 feet thick. The thickness of the overburden increases toward the valley walls and exceeds 15 feet in places.

Low terrace along the Illinois Valley

(Map pattern 3) Remnants of low-level terraces are found in several places along the Illinois Valley in Peoria County (pl. 1). The southernmost remnant occurs between Kingston Mines and the mouth of Lamarsh Creek and has an elevation of 450 to 470 feet. A small remnant lies in Peoria. Another narrow remnant extends from Mossville to Chillicothe, in the northern part of the county, and has an elevation of 450 to 480 feet.

The material comprising the low terrace between Kingston Mines and Lamarsh Creek is poorly exposed. According to Willman and Lamar (1931), a pit operating along the Illinois River near the center of sec. 30 contained fine, sandy gravel. The sand and gravel of this terrace is probably underlain by bedrock at a depth of not over 30 feet, as suggested by bedrock outcrops at an elevation of 460-470 feet at the east end of the terrace and at an elevation of 420-430 feet beneath the alluvium 2 miles south of Glasford.

The material in the low terrace between Mossville and Chillicothe is also poorly exposed, except for an idle or abandoned pit along the river edge near the center of sec. 32, T. 11 N., R. 9 E. The material exposed in this pit is largely sand and fine gravel, although some beds contain cobbles. Water wells in sec. 23, near the southern end of this terrace remnant, reveal 35 to 50 feet of sand and gravel resting beneath 4 to 12 feet of soil and fine-grained alluvium. However, the upper part of the deposit is largely sand.

Fine-grained outwash

(Map pattern 8) In several places, the Wisconsin ice sheets deposited outwash which consists mainly of silt and clay but which contains sand and gravel in some places. The sand and gravel generally rests beneath clay and silt, and may be more prevalent in some of the areas of fine-grained outwash than the poor exposures indicate.

One such area centering in sec. 2, T. 9 N., R. 7 E. occurs in front of the Bloomington Moraine southwest of Alta. Pebbly sand and gravel were found in several stream-cut banks and auger borings in this area. An overburden of 5 to 10 feet of silt may be expected, and the sand and gravel probably is less than 10 feet thick.

Fine-grained outwash with some sand and gravel also was noted in an area between the Bloomington Moraine and a bedrock hill, 3 miles northeast of Princeville, and in the valleys leading away from the hill. Eight feet of sand and gravel are exposed along the stream near the center of sec. 18, T. 11 N., R. 7 E.; but a quarter mile to the east, bedrock is exposed beneath 8 feet of clayey silt. The sand and gravel probably is less than 10 feet thick. An overburden of 5 to 10 feet of clayey silt is likely.

Kickapoo Creek valley from Dunlap north to the Peoria County line contains outwash consisting mainly of silt and clay that lies in front of the Metamora end moraine. In many places, till was observed beneath 5 to 10 feet of silt and clay. In cut banks in the NW $\frac{1}{4}$ sec. 2 and the NE cor. of sec. 11, T. 10 N., R. 7 E., 2 to 5 feet of sand and gravel overlies till and is overlain by 2 to 5 feet of silt. Gravel

was noted beneath 3 feet of silt in a cut bank in the NE $\frac{1}{4}$ sec. 23 and in an auger boring in the SW $\frac{1}{4}$ sec. 24, T. 11 N., R. 7 E. The base of the gravel was not observed in these two exposures, but the thickness of the gravel probably does not exceed 10 feet, here or elsewhere in this area.

Slackwater Deposits

Slackwater deposits (map pattern 9), are found along many of the tributaries of the Illinois River. Near the northeast corner of the county, they occur along the Senachwine and Little Senachwine Creeks as terraces at elevations of 520 to 580 feet. Sand and gravel were observed in cut banks in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 24 and near the center of sec. 12, T. 11 N., R. 8 E., and some of the other terrace remnants may contain sand and gravel. None of this sand and gravel has been exploited, and its thickness and quality are uncertain.

The next valley to the south containing extensive slackwater deposits is the valley of Kickapoo Creek. Southeast of the junction of Kickapoo Creek and its West Fork in sec. 3, T. 9 N., R. 6 E., these deposits occur as terraces at elevations of 520 to 560 feet. Most of these deposits contain sand, and some also contain pebbly sand, but no gravel was found. The sand and pebbly sand are generally overlain by silt except where they are exposed along the terrace sides.

Northeast of the junction of Kickapoo Creek and its West Fork, low terraces at elevations of 560 to 640 feet are believed to be slackwater deposits. They are poorly exposed, and it is not known whether they contain any sand and gravel.

The West Fork of Kickapoo Creek contains slackwater terraces at elevations of 540 to 600 feet. Sand and gravel were observed in these deposits in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 9; NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 11, T. 9 N., R. 5 E.; south of the center of sec. 6; and NW $\frac{1}{4}$ sec. 5, T. 9 N., R. 6 E. All but the second of these deposits have been exploited, though the pits are now idle. Elsewhere, only silt was observed in these terrace remnants, but sand and gravel may occur below the silt in places. The distribution of sand and gravel in the slackwater deposits of the West Fork is erratic, and the deposits are likely to show large variation in character over short distances.

Farther to the south, slackwater deposits occur in the valleys of Lamarsh Creek and its east and west branches. Pebbly sand was observed near the center of the north line of sec. 16, T. 7 N., R. 7 E. No gravel was observed, but it may be present in places below a silt overburden.

Two small tracts comprised of slackwater deposits were noted near the southeastern corner of the county along the east branch of Copperas Creek. Sand was observed near the center of the west line of sec. 18, T. 7 N., R. 6 E. No gravel was seen, but it may occur below silt in places. Terraces of slackwater materials occur along Walnut Creek and Spoon River in the northwest corner of the county. The materials are poorly exposed, but sand with scattered pebbles was observed near the center of sec. 6 and the center of the west line of sec. 7, T. 11 N., R. 5 E. Four feet of sandy, silty gravel is exposed beneath 5 to 7 feet of silt and sand in a small pit a quarter of a mile west of Elmore (SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 7, T. 11 N., R. 5 E.). Road cuts on the south side of the terrace remnant in the SW $\frac{1}{4}$ sec. 6 and the NW $\frac{1}{4}$ sec. 7, T. 11 N., R. 5 E., half a mile northwest of Elmore, show bedrock overlain by 2 feet of sand and gravel and 10 feet of silt. The age and origin of these deposits is not clear, but they are tentatively included with the slackwater deposits.

Dune Sand Deposits

Dune sand (map pattern 7) occurs over a large part of the high terrace along the Illinois River south of Chillicothe. The individual dunes, to a large extent, have coalesced into a sheet-like deposit that may be as much as 50 feet thick under the highest dunes. The dunes overlie the sand and gravel of the high terrace, which continues downward for another 50 feet or more. The overburden consists of sandy soil that is 1 to 3 feet thick. The dune sand is fine- to medium-grained and well-sorted. A sample analyzed by Willman (1942, p. 66) was composed of 75 percent quartz, 16 percent feldspar, and 9 percent other components.

Alluvium

(Map pattern 10) Most of the small streams of the county have narrow valley floors underlain by alluvium which is rarely over 10 feet thick, and which consists mainly of silt, clay, and clayey, poorly-sorted sand and gravel. However, in a few places, clean sand and gravel is present, which has been exploited on a small scale. A small abandoned pit along Henry Creek in the NW $\frac{1}{4}$ sec. 24, T. 11 N., R. 8 E. is an example. Two other small pits along Hallock Creek in the S $\frac{1}{2}$ sec. 28, T. 11 N., R. 8 E. are located on the valley floor, but the gravel may be an intra-till gravel exposed at valley level, rather than alluvium.

Kickapoo Creek, Spoon River, Senachwine Creek, and Walnut Creek have relatively wide valley floors. The surface material of the valley floors and banks of these streams is fine-grained alluvium, but it is not definitely known whether this alluvium grades downward into sand and gravel or is fine-grained throughout. The thickness of the alluvium is also unknown. Kickapoo Creek, Senachwine Creek, and Spoon River carried glacial outwash and may contain sand and gravel of glacial age buried beneath recent alluvium. This is especially likely where glacial outwash adjoins the valley floor, as in sec. 1, T. 8 N., R. 7 E.

The major areas of alluvium are along the Illinois River. The surface alluvium is predominantly fine-grained. The thickness and character of the underlying material is fairly well known from the records of numerous water wells in the valley. In the area of alluvium between Peoria Heights and Mossville, most well logs show more than 40 feet of sand and gravel below 10 to 60 feet of soil, clay, silt, and sand overburden. In the area of alluvium around the mouth of Kickapoo Creek, most well logs show more than 40 feet of sand and gravel beneath 10 to 40 feet of soil, clay, silt, and sand. However, wells in the alluvium between 1 and 2 miles south of Kickapoo Creek did not encounter sand and gravel. The area of alluvium between the southeastern corner of the county and a point immediately south of Glasford is very thin, averaging 12 to 15 feet in thickness and consisting mainly of clay, silt, sand, and clayey, poorly-sorted gravel. The alluvium in this area overlies bedrock which has been strip mined for coal. The nature of the material underlying the fine-grained surface alluvium in the areas at the mouths of Senachwine Creek (sec. 15, T. 11 N., R. 9 E.) and Lamarsh Creek (sec. 22, T. 7 N., R. 7 E.) is unknown. However, in the case of the former, the large areas of sand and gravel terrace, through which the creek passes, may have contributed sand and gravel to the alluvium.

Areas Devoid of Sand and Gravel

(Map pattern 11) Areas on plate 1 shown as generally devoid of sand and gravel are underlain primarily by glacial till and bedrock with a covering of loess. No sand and gravel deposits of commercial significance are known in these areas, although small deposits may be present locally. Scattered exposures in the short tributary valleys along the Illinois Valley bluffs between Mossville and Chillicothe, particularly in the SE $\frac{1}{4}$ sec. 28, T. 11 N., R. 8 E., suggest that gravel may occur within the sequence of Wisconsinan tills. Because these deposits are not continuous, because the individual deposits are probably less than 10 feet thick, and because the deposits crop out only along steep valley walls beneath a thick overburden of glacial till, no attempt was made to map them separately.

SAND AND GRAVEL INDUSTRY

Upland outwash deposits associated with the Bloomington Moraine and the high terrace along the Illinois River are the principal sources of sand and gravel in Peoria County. These are not only the most extensive and accessible deposits, but they are located close to the major population centers of Peoria and Chillicothe. Gravel pits in operation during June and July, 1964 are listed below in table 4. In addition, there are abandoned gravel pits in the county, and many that are worked only periodically. Most of these are located on plate 1.

TABLE 4 - SAND AND GRAVEL PRODUCERS IN PEORIA COUNTY

Chillicothe Gravel Co.	NW $\frac{1}{4}$ sec. 21, T. 11 N., R. 9 E.	High terrace
McGrath Sand and Gravel Co.	S $\frac{1}{2}$ sec. 17, T. 11 N., R. 9 E.	High terrace
	N $\frac{1}{2}$ sec. 35, T. 9 N., R. 7 E.	Upland outwash
Peoria County Sand and Gravel Co.	SE $\frac{1}{4}$ sec. 30, T. 10 N., R. 7 E.	Upland outwash
Stevens, Inc.	NE $\frac{1}{4}$ sec. 6, T. 8 N., R. 8 E.	Buried Shelbyville outwash
Swords and Chipman, Inc.	SW $\frac{1}{4}$ sec. 15, T. 7 N., R. 7 E.	High terrace

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