STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION

Sand and Gravel Resources of Sangamon County, Illinois

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CIRCULAR 452 1970

ILLINOIS STATE GEOLOGICAL SURVEY
URBANA, ILLINOIS 61801
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ABSTRACT

The sand and gravel of Sangamon County, composed of sand (78 to 92 percent minus 4 mesh) and fine gravel (0 to 2 percent plus 1 inch diameter), was deposited by meltwaters flowing from glaciers during the Pleistocene Epoch. Valley-train deposits in the area are confined to the Sangamon River valley and are considered to have formed during Wisconsinan time when the ice front stood to the east in Macon County. Terrace remnants along the Sangamon River east of Springfield are prominent topographic features; however, those west of Springfield are not easily recognized because the terrace has been partially buried by Holocene flood-plain deposits of the Sangamon River. Hills and ridges of sand and fine gravel in northeastern Sangamon County are believed to be related to the ice that had advanced into eastern Sangamon County during Illinoian time.

Production of sand and gravel in Sangamon County occurs east of Springfield and comes from recognizable Wisconsinan Sangamon River terrace remnants and from other deposits beneath the Holocene flood-plain sediments of the Sangamon River. Although production takes place only east of Springfield, deposits in other parts of the county are of resource quality. West of Springfield, the deposits of the partially buried terrace and the deposits beneath the Holocene flood-plain alluvium are very much like those being exploited east of Springfield. In the northeastern part of the county, the large hills and ridges of sand and fine gravel may be a source of fine aggregate, but the erratic distribution and extreme textural variability of the deposits will require thorough testing before development. On the uplands bordering the Sangamon River, an abundant supply of medium- to fine-grained sand, predominantly of aeolian origin, has possibilities of development as a "blend sand" resource.

The sand and gravel deposits are described and mapped on a scale of 1 inch: 1 mile on plate 1 (in pocket).

INTRODUCTION

This report is part of a continuing program by the Illinois State Geological Survey to supply data about the distribution, thickness, and character of active, inactive, and potential sand and gravel deposits of the state (fig. 1). The rapid growth of the Springfield area and the continued development and improvement of highways require increasing quantities of aggregate. Because there are no operating limestone quarries to fulfill this need, there is a heavy demand for sand and gravel in Sangamon County, the subject area of this investigation.

The information for this report was gathered from topographic maps, aerial photographs, outcrops, power-auger borings, drilling records of the Illinois Division of Highways, and drillers' logs in Survey files. Observations were made at all accessible sand and gravel pits, and samples were taken at a number of these localities to determine the grain-size characteristics and pebble lithologies.

Because of the loess cover, which ranges from 8 to 15 feet, the boundaries of many of the deposits shown on plate 1 are imperfectly known. The limits of the deposits are picked, for the most part, on the basis of surface expression.

PREVIOUS INVESTIGATIONS

A number of investigations have been made concerning the geology of Sangamon County; however, most of these have been only indirectly related to sand and gravel resources. One of the earliest discussions of the geology of Sangamon County was made by Worthen (1882). Leverett (1899) included Sangamon County in his study, "The Illinois Glacial Lobe." Shaw and Savage (1913) mapped the Tallula and Springfield 15-minute quadrangles and briefly described the fluvial deposits and the sand and gravel resources. In a discussion of molding sand resources in Illinois, Littlefield (1925) described some sand localities along the Sangamon River in Sangamon County. The physiographic development of the area covered by the Illinoian ice in the southern half of Illinois (which includes Sangamon County) was presented by MacClintock (1929). Selkregg and Kempton (1958) briefly discussed the unconsolidated deposits of Sangamon County and their relation to groundwater.

Recent descriptions of the Pleistocene stratigraphy of Sangamon County are included in published reports by Frye, Glass, and Willman (1962); Frye and Willman (1963); and Johnson (1964). The thickness and character of the glacial drift in Sangamon County are described in a report and map of the glacial drift in Illinois by Piskin and Bergstrom (1967). The soils of Sangamon County were described and mapped by Hopkins et al. (1912).

A report on an examination of samples and cores from test holes for a proposed dam for Lake Springfield by Ekblaw (1930) is on open file at the Illinois State Geological Survey. Also on open file is an unpublished report on the road materials resources of Sangamon County by Brown (1930).

TYPES OF DEPOSITS

Sangamon County is completely covered by varying thicknesses of unconsolidated materials deposited by wind, ice or water, mainly during the pre-Holocene Ice Age. The formal stratigraphic names of these Pleistocene materials and the sequence of times in which they were deposited are outlined in the generalized stratigraphic column (fig. 2).

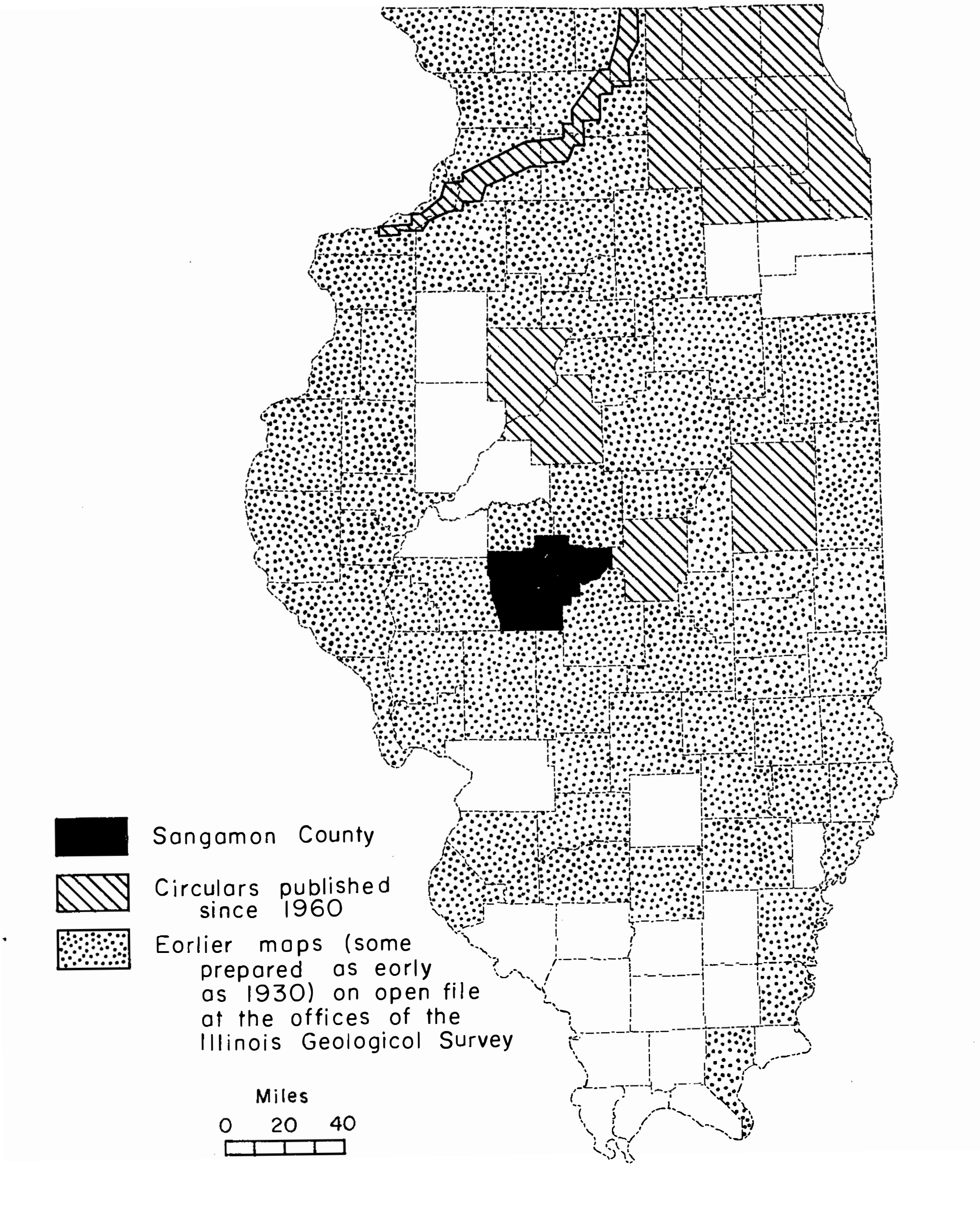

Fig. 1 - Index map showing Sangamon County and other areas where sand and gravel resources have been mapped.

Time Stratigraphy				Rock Stratigraphy	
System	Series	Stage	Substage		
QUATERNARY	Pleistocene	HOLOCENE and WISCONSINAN		Cahokia Alluvium	
		WISCONSINAN	Woodfordian	Peoria Loess Parklond Sand?	
			Farmdalian	Robein Formation	
			Altonian	Roxana Silt	
		SANGA-MONIAN		(Sangamon Soil)	Glasford Formation
		ILLINOIAN	Jubileean	Unnamed silt, sand, and grovel Radnor Till Member Roby Silt Member Hagarstown Member	
			Monican	Vandalia Till Member Mulberry Grove [redacted] Member Silt	
			Liman	Smithboro Till Member	

Fig. 2 - Generalized stratigraphic column (nomenclature taken from Frye and Willman, 1970).

Loess, a wind-blown material consisting of fine-grained, silt-size material, blankets most of the county with a thickness ranging from 8 to 15 feet. Other aeolian (wind-produced) deposits occur as dunes of fine- to medium-grained sand on the uplands adjacent to the Sangamon River (plate 1).

Most of the material underlying the loess consists of ice-laid glacial deposits called till, which is composed of a heterogeneous mixture of clay, silt, sand, gravel, and boulders. Except for minor, isolated, discontinuous deposits of sand or sand and gravel, till is of little value as a sand and gravel resource.

The water-laid deposits include Holocene alluvium, slackwater sediments, and outwash derived directly from glacial meltwater. Of particular interest for this report are the glacial outwash deposits, which are the major source of sand and gravel in Sangamon County.

Holocene Alluvium

Holocene alluvium is the material that was deposited in the flood plains after the Wisconsinan glaciers had withdrawn from the area. In the Sangamon River valley these sediments range in thickness from 10 to 30 feet and generally consist of silt and clay. Locally, however, the alluvium may contain sand and fine gravel. In the Sangamon River valley the alluvium also overlies glacial valley-train deposits of sand and fine gravel.

Slackwater Deposits

As a result of rapid sediment build-up to the level indicated by the Wisconsinan terrace remnants in the Sangamon River valley, the tributaries to the Sangamon were dammed, and thus lakes were formed. These lakes served as collecting basins for slackwater deposits (fine sediments of silt and clay) transported principally by low-energy currents. As the ice sheet retreated farther east and northeast, the water flowing through the Sangamon River channel was no longer clogged with sediment; therefore, erosion rather than deposition took place. The lakes were drained and the tributary streams cut to their present level, which conforms generally with the elevation of the Sangamon River.

For mapping purposes, the elevation of the upper level of the slackwater deposits on the tributary streams is determined by the elevation of the terrace remnants on the Sangamon River. For example, the terrace remnant near Clear Lake, sec. 22, T. 16 N., R. 4 W., appears at 630 to 640 feet (plate 1). Therefore, the terraces of slackwater deposits of the South Fork Sangamon River occur at the same elevation. Allowing for a very gentle gradient of approximately 1 foot per mile, the terraces appear in the range of 640 to 650 feet about 10 miles upstream on the South Fork Sangamon River.

Water-Laid Glacial Deposits

Water-laid glacial deposits may occur in valley trains, outwash plains, hills (kames), and elongate ridges. The valley-train sand and gravel was deposited by glacial meltwaters heavily laden with sediment and confined to channels. Often these channels were partially or completely filled with sand and gravel. In the Sangamon River valley the elevation of maximum fill is indicated by terrace remnants of the level of deposits which formerly covered the valley. According to Leighton (1921), this level of valley fill was reached during the building of the Cerro Gordo Moraine (Wisconsinan) to the east in Macon County. These terrace remnants resulted from post-glacial erosion by the Sangamon River in an attempt to return to grade.

The terrace remnants in the eastern part of the county are one of the sources of sand and fine gravel. Their surface elevation is approximately 580 feet near the eastern margin of the county and approximately 15 feet above the Sangamon River flood plain.

In the northwestern part of Sangamon County, the terrace remnants are not easily recognized. They stand little higher, topographically, than 5 feet above the flood plain, which has an elevation of about 500 feet. Shaw and Savage (1913) comment on the difficulty with which the remnants are recognized. The author believes this difficulty in topographic recognition of the terrace west and northwest of Springfield is due to a difference in depositional gradient between the Wisconsinan terrace and Holocene flood-plain deposits. The terrace deposits have a gradient of approximately 2 feet per mile while the flood-plain deposits have a lower gradient of 1 foot per mile. Therefore the surfaces of the two deposits tend to merge; and maintaining the same gradients farther west, the Wisconsinan terrace becomes buried by the Holocene flood-plain deposits of the Sangamon River.

Studies of records of wells in the eastern part of Sangamon County by Lamar (personal communication, 1969) and pit observations and screen analyses for this study indicate little physical difference in the sand and fine gravel of the terrace deposits and the sand and fine gravel beneath the flood plain. Perhaps the same deposits which make up the terrace continue under the flood-plain deposits (silt and clay) of the Sangamon River, but how they were deposited and distributed is not yet fully understood. If the deposits are continuous, the Sangamon River has simply removed Wisconsinan outwash sand and gravel to a depth of 10 to 20 feet beneath the flood plain and replaced it with Holocene alluvial deposits of silt and clay.

Other water-laid, glacially derived sand and fine gravel deposits occur in the form of hills and ridges. These sediments, which originated as the filling of large holes or crevasses in the ice, are considered by Shaw and Savage (1913) to be related to a recessional moraine of the Illinoian glaciers. These deposits of sand or sand and fine gravel are frequently referred to as ice-contact deposits and are commonly formed by rapid deposition from water very near, within, or upon the ice. Consequently, the sorting is often very poor and the sand and fine gravel is sometimes interstratified with silt or till-like material.

DISTRIBUTION OF SAND AND GRAVEL

The sand and gravel deposits of Sangamon County are discussed by type of deposit, and the following discussion and the legend of plate 1 are arranged in the order of the importance of the types as resources. Locations of the deposits sampled and the data from size analyses and pebble counts are shown in tables 1, 2, and 3, respectively. An index of the drillers' records of wells and their locations (plate 1) is given in the appendix.

TABLE 1 - SAND AND GRAVEL SAMPLES FROM SANGAMON COUNTY

Sample number	Location ¼	¼	Sec.	T.	R.	Thickness sampled (ft)	Source	Kind of deposit
1	NE	SE	8	15N	3W	8	Sand and gravel pit	Low terrace sand and gravel
2	NE	SW	22	16N	4W	6	Sand and gravel pit	Sand and gravel underlying floodplain
3	NE	NE	2	15N	4W		Dragline sample	Sand and gravel underlying flood plain
4	SW	SW	36	16N	4W		Dragline sample	Sand and gravel underlying flood plain
5	SE	SW	16	17N	3W	3	Road cut	Hills and ridges of sand and gravel
6	NW	NW	9	16N	4W	10	Sand pit	Dune sand

TABLE 2 - SIEVE ANALYSES OF SANGAMON COUNTY SAND AND GRAVEL

Tyler sieve number	U. S. standard sieve number	Sample number 1A*	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B
	1½ inch	-	-	-	-	-	-	-	-	-	-	-	-
	1 inch	1.1	98.9	-	-	.4	99.6	.8	99.2	2.0	98.0	-	-
	3/4 inch	2.1	96.8	-	-	1.6	98.0	1.7	97.5	1.8	96.2	-	-
	1/2 inch	3.1	93.7	.2	99.8	2.8	95.2	2.2	95.3	2.5	93.7	-	-
	3/8 inch	4.7	89.0	1.1	98.7	3.8	91.4	3.1	92.2	3.8	89.9	-	-
4 mesh	4	10.8	78.2	7.0	91.7	7.2	84.2	7.5	84.7	11.2	78.7	-	-
8 mesh	8	12.3	65.9	10.1	81.6	10.6	73.6	6.9	77.8	13.2	65.5	-	-
9 mesh	10	7.2	58.7	6.3	75.3	5.3	68.3	4.1	73.7	8.4	57.1	-	-
14 mesh	16	8.1	50.6	7.2	68.1	5.0	63.3	4.5	69.2	9.1	48.0	.1	99.9
35 mesh	40	30.8	19.8	27.2	40.9	26.0	37.3	27.5	41.7	30.0	18.0	20.5	79.4
48 mesh	50	8.4	11.4	15.7	25.2	17.1	20.2	16.8	24.9	8.6	9.4	20.3	59.1
80 mesh	80	7.5	3.9	19.8	5.4	14.0	6.2	17.5	7.4	5.6	3.8	37.3	21.8
100 mesh	100	1.3	2.6	2.9	2.5	1.9	4.3	3.6	3.8	1.1	2.7	10.0	11.8
200 mesh	200	1.2	1.4	1.6	.9	2.1	2.2	2.5	1.3	1.2	1.5	8.2	3.6
	Pan	1.4		.9		2.2		1.3		1.5		3.6	
	Total	100.0		100.0		100.0		100.0		100.0		100.0	
	+ 1 inch	1.1		0		.4		.8		2.0		0	
	+ 4 mesh	21.8		8.3		15.8		15.3		21.3		0	
	- 4 mesh	78.2		91.7		84.2		84.7		78.7		100	

* Percent passing and percent retained data are presented to conform to specifications established by the State of Illinois Department of Public Works and Buildings Division of Highways (Standard Specifications for Road and Bridge Construction, 1968). For each sample column A is percent retained, column B is percent passing.

TABLE 3 - PEBBLE COUNTS OF GRAVEL SAMPLES (Percent by Number of Pebbles)

	Sample number																	
	1				2				3				4				5	
	Type of sample																	
Rock type	Processed stockpile*		Bank-run channel*		Processed stockpile		Bank-run channel		Processed stockpile		Bank-run stockpile		Processed stockpile		Bank-run stockpile		Bank-run channel	
	Size fraction (inches)																	
	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8
Dolomite	44.9	45.9	30.6	26.7	13.4	18.0	Not enough sample	0	Not available	21.4	Not enough sample	22.2	32.2	14.5	13.2	22.1	18.7	25.7
Limestone	2.0	12.9	7.1	10.3	11.9	16.2		0		9.7		16.7	13.6	7.6	10.5	6.3	6.7	9.5
Chert	14.3	14.1	32.9	19.9	38.8	29.7		57.9		37.9		25.0	33.9	41.2	18.4	33.9	30.7	29.1
Sandstone and siltstone	6.1	5.9	17.6	25.4	20.9	19.8		27.4		13.8		20.8	5.1	23.7	36.8	18.9	33.3	28.4
Graywacke	8.2	4.7	1.2	2.7	1.5	1.8		4.2		2.1		0	0	3.1	0	4.7	0	.7
Dark crystalline	6.1	5.8	5.9	4.8	6.0	1.8		0		6.2		2.4	3.4	2.3	7.9	2.4	2.7	.7
Granitic	8.2	4.7	1.2	9.6	3.0	2.7		5.3		8.3		5.6	5.1	6.1	2.6	7.9	6.7	2.7
Ironstone	0	0	1.2	0	0	.9		0		0		0	0	0	2.6	1.6	0	1.4
Quartzite	10.2	5.9	2.4	.7	4.5	9.0		5.3		.7		6.9	6.8	1.5	7.9	2.4	1.3	2.0
Total percent	100.0	99.9	100.1	100.1	100.0	99.9		100.1		100.1		99.6	100.1	100.0	99.9	100.2	100.1	100.2
Total pebbles	49	85	85	146	67	111		95		145		72	59	131	38	127	75	148

*Two samples were taken at each sand and gravel operation. One was taken from the processed stockpile that consists of material prepared by washing and sieving into predetermined size fractions. The other was taken from the raw material either in a stockpile or from a channel sample of the in-place material exposed above water level. The raw material is generally referred to as bank-run.

Sand and Gravel in Terraces

Terrace remnants along the Sangamon River are an important source of sand and gravel in Sangamon County. The most prominent of these remnants occur in the eastern portion of the county (plate 1) where they generally stand about 10 to 15 feet above the Sangamon River flood plain. Because the remnants are so near the water table, complete sections of sand and gravel cannot be observed in outcrop; therefore, the thicknesses were determined from operators' and drillers' logs.

The Buckhart Sand and Gravel Company, SE$\frac{1}{4}$ sec. 8, T. 15 N., R. 3 W., is recovering sand and gravel from a terrace remnant that ranges in elevation from 545 to 550 feet. At the locality sampled for laboratory analysis, 8 feet of clean sand and gravel was exposed above the lake water level. Sample 1 of Table 2 shows that the material is composed predominantly of sand and fine gravel with slightly more than 1 percent coarser than 1 inch in diameter and approximately 22 percent greater than 4 mesh size. The deposit is reported by the operator to be as thick as 40 feet and covered by overburden approximately 10 feet thick.

Another terrace remnant that has been worked for sand and gravel is located in secs. 15 and 22, T. 16 N., R. 4 W. This remnant, which is approximately 6 miles downstream from the Buckhart Sand and Gravel Company, occurs at an elevation of approximately 535 feet. This elevation conforms to the gradient of 2 feet per mile for the Sangamon River during the development of this level of stream deposition. Drillers' records from the SW$\frac{1}{4}$ SW$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 15, and from the NE$\frac{1}{4}$ NE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 22, show 49 feet of sand and fine gravel under 7 feet of overburden, and 64 feet of sand and gravel with no overburden, respectively. A power-auger hole drilled for this study in the SE$\frac{1}{4}$ NW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 22, exposed 10 feet of silts and clays over coarse, clean sand of unknown thickness. Because the old pits in this terrace are so overgrown with vegetation, samples were not available for laboratory analysis.

Other possible terrace remnants occur along the Sangamon River (plate 1); however, to the writer's knowledge, no pits have been opened in any of these. A driller's record from the terrace in the east half of sec. 34, T. 16 N., R. 2 W., reports 12 feet of sand and gravel underlying 15 feet of overburden.

Terrace remnants on the Sangamon River north and northwest of Springfield show only slight topographic expression. It is possible that the terrace deposits were buried by Holocene Sangamon River flood-plain alluvium.

Sand and Gravel Underlying Stream Alluvium

Sand and fine gravel of varying thickness appears to be present under Holocene flood-plain deposits of the Sangamon River throughout the length of its valley. In secs. 3 and 4, T. 15 N., R. 2 W., a number of wells show that the sand and gravel averages about 30 feet in thickness and underlies approximately 15 feet of overburden (plate 1). Northwest of the town of Buckhart in secs. 5 and 6, T. 15 N., R. 3 W., and sec. 12, T. 15 N., R. 4 W., the sand and gravel reported by drillers' logs averaged over 100 feet in thickness and had no overburden. These figures, however, are anomalous when compared with data from other areas of the valley. The operators of the Sangamon Valley Sand and Gravel Company, NE$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 2, T. 15 N., R. 4 W., and the Springfield Sand and

Gravel Company, SW¼ sec. 36, T. 16 N., R. 4 W., both report sand and gravel thicknesses of approximately 60 feet underlying about 10 feet of overburden.

Farther downstream on the Sangamon River, Clear Lake Sand and Gravel Company is located on the flood plain near the edge of the terrace in the NE¼ SW¼ sec. 22, T. 16 N., R. 4 W. There sand and gravel thickness ranges from 45 to 60 feet, with approximately 5 feet of overburden.

South of the town of Peabody in the NE¼ sec. 1, T. 16 N., R. 5 W., drillers' records show 26 to 42 feet of sand and gravel underlying 18 to 27 feet of overburden. Five drill records from the area of Horseshoe Lake, secs. 32 and 33, T. 17 N., R. 5 W., report less than 20 feet of sand and gravel underlying approximately 20 feet of overburden. In the NW¼ sec. 12, T. 16 N., R. 6 W., two drillers' records show 6 to 10 feet of silt and clay overlying 41 to 45 feet of sand and gravel.

Because samples are not available from areas other than those where sand and gravel is being worked, little is known about the textural character of the unworked material. Sample 2 (table 2) from the upper 6 feet of the deposit at Clear Lake Sand and Gravel Company (table 4) suggests that the deposit is composed predominantly of sand. The size fraction coarser than 4 mesh is slightly greater than 8 percent. Samples 3 and 4 (table 2) from Sangamon Sand and Gravel Company and Springfield Sand and Gravel Company show that approximately 15 percent is coarser than 4 mesh.

With the exceptions of Buckhart Creek and Long Point Slough (plate 1), the tributaries of the Sangamon River are considered unlikely sources for large deposits of sand and gravel. The parallel orientation of Buckhart Creek, secs. 16 and 17, T. 15 N., R. 3 W., with the Sangamon River, suggests that the creek may have served as an outlet channel for glacial meltwater flowing from the east. A driller's log from the NW¼ SW¼ sec. 16, reported 34 feet of sand and gravel underlying 18 feet of overburden. Long Point Slough enters the

TABLE 4 - SAND AND GRAVEL PRODUCERS HAVING FIXED EQUIPMENT IN SANGAMON COUNTY (FALL, 1969)

Producer	Mailing address	Location	Type of deposit
Buckhart Sand and Gravel Company, Inc.	R. F. D. Mechanicsburg, Illinois 62545	SE¼ sec. 8, T. 15 N., R. 3 W.	Low terrace of Sangamon River
Clear Lake Sand and Gravel Company	P. O. Box 378 Springfield, Illinois 62705	NE¼ SW¼ sec. 22, T. 16 N., R. 4 W.	Glacial sand and gravel underlying river alluvium
Sangamon Valley Sand and Gravel Company	Springfield, Illinois 62700	NE¼ NE¼ NE¼ sec. 2, T. 15 N., R. 4 W.	Glacial sand and gravel underlying river alluvium
Springfield Sand and Gravel Company	426 S. Fifth St. Springfield, Illinois 62701	SW¼ sec. 36, T. 16 N., R. 4 W.	Glacial sand and gravel underlying river alluvium

Sangamon River just south of Illiopolis, sec. 17, T. 16 N., R. 1 W., and has its headwaters in the Shelbyville Moraine to the east in Macon County. Because this stream served as an outwash channel for the meltwaters of the Shelbyville ice, there is a considerable amount of sand and fine gravel throughout its length. A well record from the NE$\frac{1}{4}$ NE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 17, T. 16 N., R. 1 W., reported 33 feet of very coarse sand underlying 12 feet of silt and clay. In the SW$\frac{1}{4}$ SE$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 8, T. 16 N., R. 1 W., a well record shows 29 feet of gravelly sand overlain by 10 feet of silt and clay.

Brown (1930) reported terraces along the South Fork Sangamon River near the town of Cascade, secs. 11 and 12, T. 14 N., R. 4 W., which may contain sand and gravel. A hole power-augered in the terrace in the SW$\frac{1}{4}$ NE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 12, T. 14 N., R. 4 W., revealed the following materials in descending order: 13 feet of silt (loess), 3 feet of dirty sand, and 2 feet of clean, coarse sand overlying bedrock. The topographic form is therefore a destructional terrace cut in bedrock rather than a constructional terrace made of sand or sand and gravel. The other erosional remnants in this vicinity of the South Fork Sangamon River valley are therefore also likely to be underlain by bedrock at shallow depths.

Hills (Kames) and Ridges (Ice-Channel Fillings) of Sand and Gravel

Hills and ridges of sand and gravel resulting from ice-contact deposition are conspicuous topographic features in northeastern Sangamon County (plate 1) and are the product of the Illinoian Stage of glaciation. The hills in the area of the town of Buffalo Hart on secs. 15, 16, 17, 20, 21, 22, and 28, T. 17 N., R. 3 W., are probably related to, or part of, the Buffalo Hart Moraine (Johnson, 1964). The linear ridge trending generally northeast-southwest from sec. 24 to sec. 33, T. 17 N., R. 3 W., across the Sangamon County line into Logan County is probably a crevasse (large crack in the ice) filling. This and other ridges of Illinoian sand and fine gravel in Sangamon County may correlate with similar deposits called "Hagarstown beds" by Jacobs and Lineback (1969) in their study in Fayette County.

The only outcrop with a good exposure of sand and gravel is found in a roadcut along U. S. Highway 54, NE$\frac{1}{4}$ SE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 16, T. 17 N., R. 3 W. The clean sand and fine gravel (sample 5, tables 1, 2, 3) of unknown thickness is overlain by 15 to 20 feet of overburden. The overburden, in descending order, consists of 6 to 8 feet of silt and 8 to 10 feet of clayey, reddish, deeply weathered sand and gravel. The latter zone of material is called the Sangamon Soil. This soil profile developed as a result of thousands of years of weathering and is classified as overburden because of the abundance of secondary (pedogenic) clays and a high percent of deleterious rock fragments (mainly chert).

The lateral continuity of sand and gravel in these hills and ridges is unpredictable. For example, in NW$\frac{1}{4}$ NW$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 22, T. 17 N., R. 3 W., 18 feet of silt and clay overburden was penetrated by power auger before silty sand was encountered. Because only 5 feet of sand was penetrated, the total thickness of the sand is unknown. Further power-auger exploration of a hill in SE$\frac{1}{4}$ NW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 28, T. 17 N., R. 3 W., showed only silt and silty, pebbly clay to a depth of 33 feet. The material penetrated by power auger to 38 feet below surface in the NE$\frac{1}{4}$ NE$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 34, T. 17 N., R. 3 W., consists of 15 feet of silt (loess) overlying 23 feet of silt and sandy silt (ponded sediments). Test holes power-augered in the hill in the SE$\frac{1}{4}$ SE$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 3, T. 16 N., R. 3 W., and in the localities south of this location (plate 1) all showed till underlying approximately 12 feet of loess.

A test hole power-augured in the ridge east of the town of Buffalo Hart in the NE$\frac{1}{4}$ NW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 24, T. 17 N., R. 3 W. (plate 1), revealed clean, pebbly sand underlying 14 feet of overburden consisting mainly of loess. Because the hole could not be kept open owing to caving, only 6 feet of the sand was penetrated. In Logan County, 2 miles northeast of this test hole, a limestone quarry opened in this same ridge exposes bedrock overlain by 20 to 30 feet of sand that contains some fine gravel and is deeply weathered in the upper 10 to 15 feet. Because no gravel coarser than 1 inch in diameter was observed in the quarry exposure, it is very unlikely that coarse gravel underlies the hill in sec. 24, which is a continuation of the same ridge.

Two test holes power-augered on the southwest extension of this same ridge, NW$\frac{1}{4}$ SW$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 23, and SE$\frac{1}{4}$ SW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 27, both of T. 17 N., R. 3 W., showed more than 15 feet of silts and sandy silts (ponded sediments) underlying approximately 15 feet of loess. The data gathered from the test auger holes and the outcrop observation in this linear topographic form suggest that the direction of flow of water which deposited the materials was from northeast to southwest. The coarsest sediments were deposited for the most part in the northeast extension of the ridge north of the Sangamon County line. Therefore, it is likely that the ridge deposits in secs. 23, 26, and 27 of T. 17 N., R. 3 W., consist of only fine-grained sediments (silt and sand).

According to the information available, the most promising areas for sand and gravel of resource quantity are in secs. 16, 24, and possibly 21, in T. 17 N., R. 3 W. Because of a complicated geologic history, the mode of deposition of these materials is not fully understood; thus the prediction of types of deposits at any one locality is tenuous. Thorough exploration is required before exploitation of this area is undertaken.

Slackwater Deposits

Slackwater deposits are found along most of the larger tributaries of the Sangamon River (plate 1). Power-augering in the terrace of Sugar Creek, NW$\frac{1}{4}$ NE$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 32, T. 16 N., R. 4 W., penetrated approximately 16 feet of silt and clay (slackwater deposits). The actual thickness is unknown. From test holes drilled for the Lake Springfield dam on Sugar Creek, SE$\frac{1}{4}$ sec. 12, T. 15 N., R. 5 W., Ekblaw (1940) reports that the stratigraphy in descending order consists of 5 to 6 feet of black loam, 14 feet of yellowish silt, 18 feet of bluish-gray silt and $\frac{1}{2}$ to 4$\frac{1}{2}$ feet of gravel lying on bedrock. In the same report Ekblaw describes the sediments penetrated by drilling test holes in the South Fork Sangamon River, sec. 17, T. 15 N., R. 4 W., as consisting of approximately 40 feet of clay and sand in discontinuous lenses. The clay, silt, and sand deposits from the two localities described by Ekblaw are considered to occur throughout the greater length of these tributaries (plate 1). Considerable thicknesses of slackwater deposits are also present in the valley of Spring Creek. A power-auger test in NE$\frac{1}{4}$ SE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 10, T. 16 N., R. 5 W., exposed more than 18 feet of silt and silty clay without reaching the base of the deposit.

Although little deep subsurface information is available for the tributaries to the Sangamon River, they are considered to be poor prospects for sand and gravel. However, the presence of thin discontinuous deposits of sand and fine gravel, particularly in the buried channels of these streams, is probable.

Sand Dunes

Hills and ridges of sand border the Sangamon River flood plain and are most conspicuous in secs. 4, 6, 9, 10, 15, 22, 23, and 26, T. 16 N., R. 4 W.; secs. 1, 3, 4, 5, 6, 7, 8, 9, 11, and 12, T. 16 N., R. 5 W.; secs. 23, 25, 26, 35, and 36, T. 17 N., R. 6 W.; and secs. 1 and 2, T. 16 N., R. 6 W. (plate 1). According to Savage (1907) these deposits are aeolian.

The distribution of these sands (plate 1), usually on the east or south side of the Sangamon River (downwind side with relation to the northwesterly winds), supports the interpretation of aeolian origin. A study of these deposits in the vicinity of the Sangamon-Macon County border by Hester and Labotka (1970) concluded that, for the most part, these sands are aeolian. In general, these materials in Macon and Sangamon counties are too coarse (20 to 30 percent passing U. S. Standard sieve number 80) to meet present "blend sand" (FA-10) specifications (described on p. 15 , this text); some of them, however, do meet the size requirement. Although extensive exploration may be necessary to prove out areas of this finer material, this upland region bordering the Sangamon River flood plain is considered to be a potential "blend sand" source.

Areas Devoid of Sand and Gravel

The areas illustrated on plate 1 by the blank pattern are generally devoid of sand and gravel and are areas of glacial till overlain by a veneer of loess that generally ranges in thickness from 8 to 15 feet. Water-well borings and deep foundation tests have also revealed sand and gravel in many localities underlying or interbedded with glacial till, but the limited thickness of the gravel or the excessive depth of its occurrence makes its recovery economically impractical at present.

PHYSICAL CHARACTERISTICS OF THE SAND AND GRAVEL

In the materials sampled for this study no gravel coarser than $1\frac{1}{2}$ inches in diameter was found (table 2); however, some material that is coarser than 2 inches in diameter has been observed in the pits. Little difference can be seen in the sand and gravel from the different areas sampled, except that the terrace and ridge samples (1 and 5) have approximately 5 percent more material coarser than 4 mesh than the samples from below the Sangamon River flood plain (2, 3, and 4). The percentage of sand (minus 4 mesh) for all samples of sand and gravel ranges from 78 to 92 (samples 1 through 5, table 2).

For determination of the pebble lithologies, two samples were taken wherever available (table 3): one from a processed stockpile of a specific size fraction and the other from the pit as a channel sample (bank-run). The two samples were taken to determine whether there was any difference in the pebble lithologies of the materials sampled in place near the surface from the lithologies of those brought to the surface by dragline from a deeper, underwater part of the deposit.

In the terrace deposit (sample 1, table 3) the percentage of chert and sandstone-siltstone is considerably higher for the bank-run channel sample than for the processed stockpile sample while the percentage of carbonates is considerably lower for the bank-run sample than for the processed sample. These differences may be a result of the leaching of some carbonate pebbles from the aggregate sampled near the surface. In sample 2, the absence of carbonates in the bank-run channel sample taken from material very near the surface, contrasted to their presence in the processed sample, also suggests that carbonates were removed by leaching. The two different sets of samples show that samples taken near the surface can provide misleading information for the entire deposit. The samples taken from the processed stockpiles are more representative of the deposits. The bank-run samples taken for sieve analyses in sample numbers 3 and 4 came from material brought from deep within the deposit by dragline. As would be expected, the percentages of the various constituents of both the bank-run and processed samples are very similar.

The grain size of the aggregate from Sangamon County is generally finer than the grain size of the sand and gravel in the Sangamon valley of Macon County (Hester and Anderson, 1969). In Macon County the proportion of particles greater than 4 mesh ranged from 10 to 49 percent with an average of 31 percent while in Sangamon County the plus 4 mesh particles ranged from 8 to 22 percent with an average of 17 percent. This difference suggests an overall reduction in grain size downstream from the source to the east.

The quantity of chert in the samples taken for this study is considerably higher than that found in samples from Macon County. The average chert percentage was 29 for Sangamon County as opposed to 12 for Macon County. This higher percentage of chert found in the Sangamon River valley deposits may be a result of the erosion of deeply leached Sangamon soil by the tributaries which transported the chert to the Sangamon valley.

USES

Sand and gravel from Sangamon County is used principally in road construction. Specifications for the various types of sand and gravel aggregates used in road and bridge construction have been outlined by the Division of Highways (State of Illinois, 1968). The principal grade produced in Sangamon County is "torpedo sand," FA-1, which is used primarily in concrete production but also as a mix with "blend sand," FA-10, in the production of FA-3, the fine aggregate used in the production of the bituminous mixture "asphalt."

The materials from the Sangamon River valley have an almost natural grade as "torpedo sand," FA-1 (table 2). The specifications for the sand are as follows:

U. S. Standard Sieve Number	Percent Passing
4	94 - 100
16	45 - 85
50	3 - 29
100	0 - 10

Because very little sand in the Sangamon River valley deposits is fine enough to pass the U. S. Standard number 80 screen (table 2), a relatively small quantity of "blend sand" is produced.

Specifications for "blend sand," FA-10, are as follows:

U. S. Standard Sieve Number	Percent Passing
10	100
40	80 - 100
80	30 - 90
200	0 - 14

A small amount of coarse aggregate is produced in the area; it is used generally for portland cement concrete. The grades are CA-3, CA-5 and CA-7. Their specifications are:

U. S. Standard Sieve Number	CA-3	CA-5	CA-7
		Percent Passing	
3 inch	—	—	—
2½ inch	100	—	—
2 inch	86-100	100	—
1½ inch	35-75	94-100	100
1 inch	0-16	15-65	90-100
½ inch	0 - 6	0-10	30-60
4 —	—	0-6	0-10

SAND AND GRAVEL INDUSTRY

Four sand and gravel operators are the major producers of sand and gravel in Sangamon County. Their pits are located in the terrace and in the flood plain of the Sangamon River. Gravel pits that were in operation during the fall of 1969 appear in Table 4. Locations of known pits, including those that are abandoned, are shown on plate 1.

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APPENDIX - SAND AND GRAVEL REPORTED FROM WELLS IN SANGAMON COUNTY*
(Plotted on Plate 1)

Location						Description	Thick- ness in ft.	Depth to top
¼	¼	¼	Sec.	T.	R.			
NW	NW	NW	3	15N	2W	Sand and gravel, clean	10	25
SW	NW	NW	3	15N	2W	Sand, very coarse	40	5
SW	SW	NW	3	15N	2W	Gravel, fine, clean	23	15
SE	NW	NW	3	15N	2W	Gravel, fine, clean	18	12
SE	SW	NW	3	15N	2W	Sand, medium-coarse, pebbly, clean	36	16
SE	SE	NE	4	15N	2W	Sand and gravel	37	8
SE	NE	SE	4	15N	2W	Sand, very coarse	20	15
C	SE	NE	4	15N	2W	Sand, coarse, pebbly, clean	25	10
WC	NE	NE	4	15N	2W	Gravel, fine, clean	20	20
WC	NE	SW	4	15N	2W	Sand, coarse, clean	20	10
WC	SE	SW	4	15N	2W	Gravel, fine, clean	25	12
SE	SW	SE	5	15N	2W	Sand, medium-coarse, pebbly	22	7
NE	SW	SE	5	15N	2W	Sand, very coarse, pebbly, clean	19	8
NW	SE	SW	5	15N	2W	Gravel, dirty	16	9
NE	SW	NE	8	15N	2W	Gravel, fine, clean	18	10
NE	SE	NW	8	15N	2W	Gravel, fine, clean	23	7
NE	NW	NW	13	15N	3W	Sand and gravel	22	0
SC	NW	SW	16	15N	3W	Sand and gravel	34	18
SC	SE	SE	8	16N	1W	Sand, gravelly	29	10
SW	SE	SE	8	16N	1W	Gravel, fine, dirty	14	6
NE	NE	SW	17	16N	1W	Sand, very coarse	33	12
NW	NW	NW	20	16N	1W	Gravel, fine-medium, clean	48	5
SW	NE	SW	25	16N	2W	Gravel, fine, dirty	5	15
SC	SW	SW	25	16N	2W	Gravel, clean	27	8
NW	NE	SW	25	16N	2W	Sand, coarse, pebbly	20	15
EC	SW	SE	26	16N	2W	Gravel, sandy	10	15
SW	NW	SE	26	16N	2W	Gravel, fine, dirty	13	7
SW	SW	SW	34	16N	2W	Gravel, fine, dirty	18	10
NW	SE	NE	34	16N	2W	Gravel, fine, clean	12	15
NW	SE	NW	35	16N	2W	Gravel, fine, clean	25	15
NW	NW	SW	35	16N	2W	Gravel, fine, clean	12	28
SW	NE	SW	9	16N	4W	Sandy, gravel	15	15
SW	SW	SE	15	16N	4W	Sand and gravel	49	7
	SW	NE	16	16N	4W	Sand and gravel	10	17
NE	NE	SW	22	16N	4W	Sand and gravel	64	0
SE	SW	NW	22	16N	4W	Sand and gravel	32	5
SW	SE	SW	25	16N	4W	Sand and gravel	16	18
SW	SE	SW	25	16N	4W	Sand and gravel	22	13
SW	SW	NE	1	16N	5W	Sand and gravel	42	18
NW	NE	NE	1	16N	5W	Sand and gravel	26	27
NW	SE	NW	12	16N	6W	Sand and gravel	45	6
SW	NE	NW	12	16N	6W	Sand and gravel	41	10
SE	SE	NE	32	17N	5W	Sand and gravel	6	14
SE	SE	NE	32	17N	5W	Sand and gravel	16	15
SE	SE	NE	32	17N	5W	Sand and gravel	17	14
SE	SW	NW	33	17N	5W	Sand and gravel	8	20
SE	SE	SW	33	17N	5W	Sand and fine gravel	20	16

*Taken from Survey files.

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Topographic mapping in cooperation with the United States Geological Survey.

Illinois State Geological Survey Circular 452
20 p., 2 figs., 4 tables, app., 2000 cop., 1970
Urbana, Illinois 61801

Printed by Authority of State of Illinois, Ch. 127, IRS, Par. 58.25.

CIRCULAR 452

ILLINOIS STATE GEOLOGICAL SURVEY

URBANA 61801