STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION

SAND AND GRAVEL RESOURCES OF MACON COUNTY, ILLINOIS

Norman C. Hester
Richard C. Anderson

CIRCULAR 446 1969

ILLINOIS STATE GEOLOGICAL SURVEY
URBANA, ILLINOIS 61801
John C. Frye, *Chief*

SAND AND GRAVEL RESOURCES OF MACON COUNTY, ILLINOIS

Norman C. Hester and Richard C. Anderson

ABSTRACT

The sand and gravel deposits of Macon County are described and mapped on a scale of 1:62,500. The most extensive deposits are located in the low terraces and floodplain of the Sangamon River, but an abundant supply of sand and fine gravel of Wisconsinan age is available in terraces on many of the streams tributary to the Sangamon, in reentrants on the Shelbyville Moraine, and, to a lesser extent, in its outwash apron.

Kames and elongate ridges of sand and gravel of Illinoian age are prominent features in the southwestern portion of the county.

INTRODUCTION

This report on Macon County is part of a program of the Illinois State Geological Survey to supply information regarding sand and gravel resources in Illinois (fig. 1). It provides information on the distribution, thickness, and character of abandoned, operating, and potential sand and gravel deposits.

Macon County, which includes the city of Decatur, has a heavy demand for construction aggregates but not too plentiful reserves. As there are no operating limestone quarries, the construction industry needs sand and gravel for a local supply of aggregate for concrete and material for surfacing secondary roads.

Methods of Study

Information gathered from topographic maps, aerial photographs, outcrops, power-auger borings, drilling records of the Illinois Division of Highways (District 5), and drillers' logs was used to determine the thickness and lateral distribution of the sand and gravel deposits. Observations were made at all accessible sand and

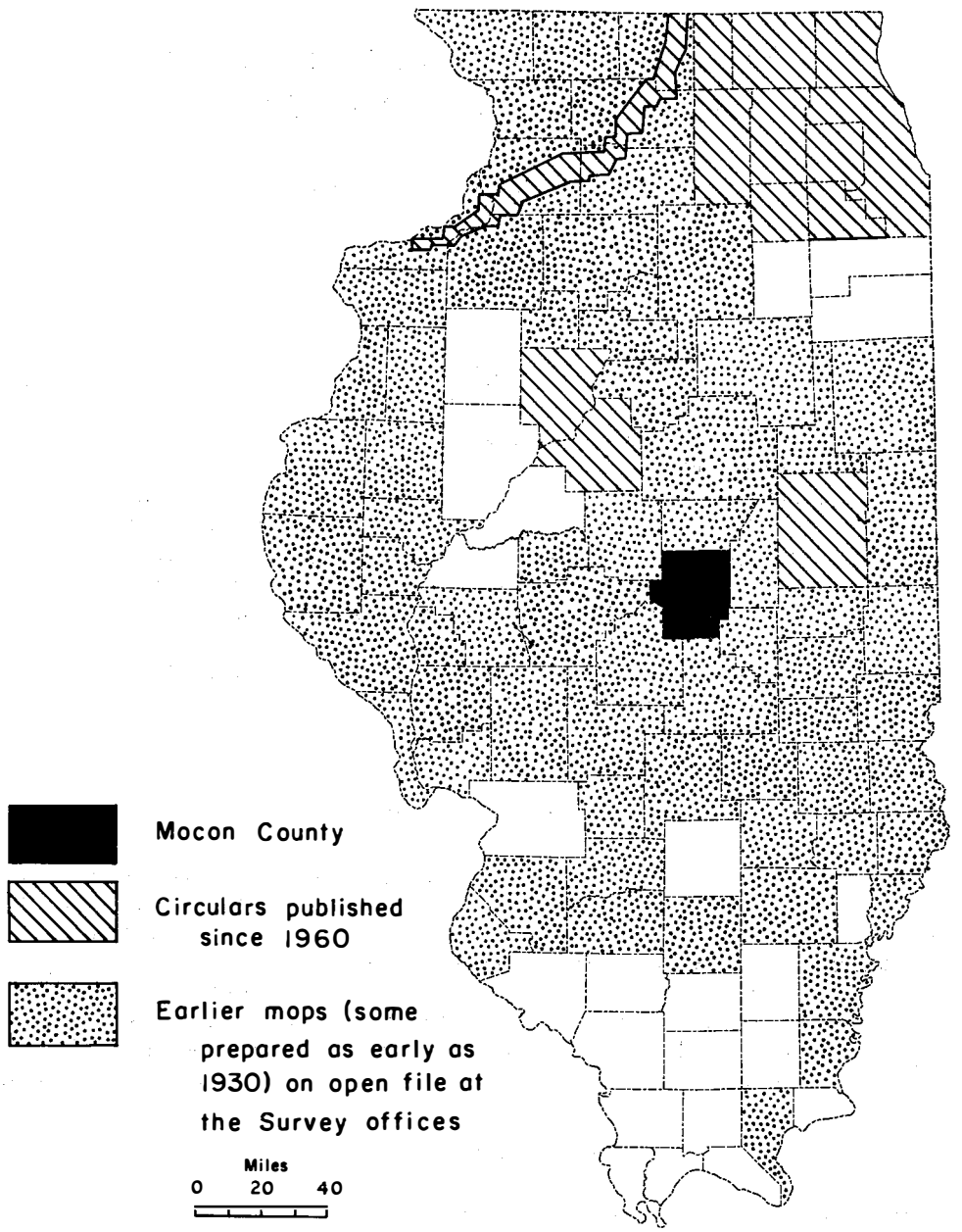

Fig. 1 - Index map showing Macon County and other areas where sand and gravel resources have been mapped.

gravel pits, and a number of these localities were sampled for the determination of grain size characteristics and pebble lithology. The analyses in tables 2 and 3 are based upon one sample from each pit.

Many of the boundaries described are accurate within rather broad limits; this is particularly true for the kames, elongate ridges, and valley trains west of the Shelbyville Moraine. Margins to the moraines are placed arbitrarily because data are insufficient to distinguish accurately between outwash aprons, solifluction features (mud-flow), or actual end moraine till.

Previous Investigations

A general description of the geology of Macon County was made by Broadhead (1875). Leverett (1899) included a discussion of the Pleistocene geology of Macon County in "The Illinois Glacial Lobe." Leighton (1921) discussed the glacial history of the county in a report on the Sangamon River Valley. The Pleistocene deposits and their relationship to the types of soils found in this county were described by Smith et al. (1929). In an evaluation of the road materials resources of Macon County, Krumbein (1930) and Brown (1930) made general observations on the areal geology of the county and described the occurrence and distribution of sand and gravel. Horberg (1953) briefly discussed the Pleistocene geology of the Macon County area; however, his report was concerned primarily with the pre-Wisconsinan deposits and the Sangamonian surface.

The Pleistocene geology of the Decatur Quadrangle (1:250,000), of which Macon County is a part, is presently being prepared by Jerry A. Lineback of the Illinois State Geological Survey.

Acknowledgments

The writer extends thanks to the Illinois Division of Highways (District 5) for drilling two deep holes in the moraine front.

TYPES OF DEPOSITS

Unconsolidated materials deposited by wind, ice, or water, for the most part during the Pleistocene Epoch, cover all of Macon County. Fine-grained, silt-size material called loess, deposited by wind, blankets surficial materials of the county. This material, on which the soils of Macon County are developed, covers the glacial drift, both ice- and water-laid, at thicknesses varying from 1 to 12 feet. Other aeolian (wind-produced) deposits, occurring as sand dunes, are found adjacent to the north side of the Sangamon River from the Shelbyville Moraine (Lincoln Homestead Memorial Park area) west to the Macon County line (pl. 1, in pocket).

The vast majority of the deposits of Macon County that underlie the loess are ice-laid glacial deposits called till, which locally contains lenses of gravel, sand, and silt. In this discussion and on the legend of plate 1, these deposits will be referred to as ice-laid glacial drift. The drift is largely a heterogeneous mixture of clay, silt, sand, gravel, and boulders, and with the exception of minor isolated discontinuous deposits, is presently of no value as a sand and gravel resource.

The water-laid deposits of the county may be placed in two distinct categories: (1) glacial drift deposited as outwash derived from waters of the melting glacier, and (2) floodplain materials deposited in river bottomlands after the glaciers retreated from the area. These two general types of deposits serve as the major source of the sand and gravel in Macon County; therefore, the following descriptions and discussion will refer principally to these deposits.

Water-Laid Glacial Drift

Water-laid glacial drift may occur in valley trains, outwash plains, kames, and elongate ridges. The deposits in valley trains were laid down by glacial meltwaters, which were heavily laden with sediment and confined to channels (e.g. Sangamon Valley). Often these channels were completely or partially filled with sand and gravel. Part of the material was later eroded, leaving flat-lying areas called terraces. Terraces contain some of the better sand and gravel deposits of Macon County.

Outwash plains are most commonly associated with and are found marginal to moraine fronts. Because glacial waters that formed these deposits were not confined to channels, the deposits are sheet-like in form, and have a somewhat erratic distribution. Their grain size generally grades from coarse to fine going away from the moraine. Because the Shelbyville till in Macon County contains little material greater than 2 inches in diameter, coarse gravels are rarely found in outwash materials associated with the moraine front.

Recessed areas or re-entrants along the Shelbyville Moraine front frequently contain sand and gravel deposits. These areas, which merge with the outwash plain, commonly served as sediment traps for granular material while the ice was present and during the waning stage of the glacier.

Other water-laid sand and gravel deposits occur in the form of hills and ridges. These sediments, which originated as the filling of large holes or cracks in the ice, are frequently referred to as ice-contact deposits. They commonly formed by rapid deposition from water very near to, within, or upon the ice, and consequently, the sorting is often very poor. Because the Sangamon Soil is developed on these hills and ridges of Illinoian age, the upper 10 feet of the sand and gravel contains impurities of clay and silt that resulted from weathering.

Recent Alluvium

Recent alluvium is a term used for the material that was deposited in the floodplains after the glaciers had withdrawn from the area. These sediments consist mostly of silt and clay. Locally, however, they contain sand and fine gravel. In the larger valleys, they commonly overlie valley train deposits of glacial sand and gravel.

DISTRIBUTION OF SAND AND GRAVEL

The sand and gravel deposits of Macon County are discussed in the following paragraphs in order of their importance as resources. The legend of plate 1 is arranged in this same order. Many of the pit locations shown on plate 1 have

been taken from the map accompanying the reports by Brown (1930) and Krumbein (1930). Although some of these pits can no longer be located, principally because of residential development along Stevens and Spring Creeks and partly because some old pits are being used as sanitary land fills along the Sangamon River, their locations are given to illustrate that sand and gravel was or still may be available in these areas. The locations of sand and gravel deposits sampled for this study are found in table 1. The sieve analyses and pebble counts of these 10 samples are given in tables 2 and 3.

Lower Terrace Sand and Gravel

Remnants of low-level terraces occur along the Sangamon River and most of its major tributaries. The deposits along the Sangamon are more important, however, because of their great thickness and lateral extent. The three main sand and gravel producers in Macon County are located on the low terraces of the river: Decatur Hydraulic Sand and Gravel Company, Macon County Sand and Gravel, Inc., and Johnson Sand and Gravel Company. The terraces occur at an elevation of 650 to 660 feet in northeastern Macon County (Secs. 30 and 31, T. 18 N., R. 4 E.) and decrease in elevation to 580 to 600 feet west of the Shelbyville Moraine in the western part of the county (pl. 1). This provides a gradient of approximately 3 feet per mile for the Sangamon River and its tributaries at the time of lower terrace formation.

TABLE 1 – LOCATION OF SAND AND GRAVEL SAMPLES FROM MACON COUNTY

Sample no.	Location ¼ ¼ ¼	Sec.	T.	R.	Thickness sampled (feet)	Source	Kind of deposit
1	NE NE NE	13	14N	1E	6	Abandoned gravel pit	Low terrace
2	SE NE SW	32	16N	3E	7	Abandoned gravel pit	Low terrace
3	NE NE SE	32	16N	1E	Dredge sample	Gravel pit	Low terrace
4	SW SE NW	33	16N	3E	10	Gravel pit	Low terrace
5	NW NW NE	31	18N	4E	9	Auger hole	Low terrace
6	NE NW SW	31	15N	1E	15	Gravel pit	Kame
7	NE NW NE	21	16N	2E	Dredge sample	Gravel pit	Low terrace and floodplain
8	SW SW NE	2	15N	3E	12	Gravel pit	Floodplain
9	SW SE SE	29	16N	1E	Dredge sample	Gravel pit	Low terrace
10	SW NE SE	18	17N	4E	4	Abandoned gravel pit	Low terrace

TABLE 2 - SIEVE ANALYSES OF MACON COUNTY SAND AND GRAVEL (PERCENT RETAINED)

Sieve	Sample number									
	1	2	3	4	5	6	7	8	9	10
2½ inch	–	3.88	–	–	–	3.08	(Sample not available)	–	–	–
2 inch	–	3.56	3.16	–	–	3.98		–	1.17	–
1½ inch	.64	6.60	2.01	–	–	3.66		3.23	1.50	–
1 inch	–	2.01	3.49	–	2.70	5.18		7.81	1.60	.42
3/4 inch	2.02	5.26	3.63	.18	2.73	6.57		5.85	2.53	1.92
1/2 inch	1.74	3.71	3.67	1.19	2.44	4.76		6.18	2.97	3.05
3/8 inch	3.39	5.53	6.27	2.10	3.56	7.07		7.24	4.51	5.68
3 mesh	4.97	5.56	7.14	2.80	4.27	6.67		6.66	5.38	5.87
4 mesh	6.88	6.45	8.73	4.29	5.32	8.34		7.63	6.52	7.02
6 mesh	4.94	7.84	7.95	3.76	6.07	5.52		4.46	4.77	5.78
8 mesh	6.66	8.03	7.91	5.88	5.28	7.54		6.22	5.38	6.11
10 mesh	7.77	7.97	7.84	7.73	5.43	7.44		6.07	5.95	4.78
14 mesh	7.63	7.45	6.92	8.31	5.79	7.44		5.66	6.34	4.14
20 mesh	7.98	7.23	7.33	9.41	6.20	6.36		5.41	6.88	3.62
28 mesh	8.90	6.66	7.24	10.44	7.59	4.92		5.56	8.16	5.10
35 mesh	4.29	2.50	3.08	5.55	3.60	1.87		2.55	4.04	3.18
48 mesh	17.51	6.76	8.36	23.73	15.46	5.15		7.89	16.87	21.89
65 mesh	8.21	1.76	2.46	8.93	8.59	1.73		3.18	7.82	11.62
100 mesh	4.05	.55	1.02	3.28	5.29	.85		5.81	4.04	3.63
150 mesh	1.24	.16	.44	.71	2.16	.39		.55	1.31	1.61
200 mesh	.44	.09	.29	.24	1.12	.23		.28	.53	1.18
270 mesh	.18	.05	.16	.10	.64	.13		.17	.25	.71
pan	.55	.34	1.00	1.31	5.81	.85		1.73	1.50	2.72
Total	99.99	99.95	100.10	99.94	100.05	99.73		100.14	100.02	100.03
+ 1 inch	.64	16.05	8.66	–	2.70	15.90		11.04	4.27	.42
+ 4 mesh	19.64	42.56	38.10	10.56	21.02	49.31		44.60	26.18	23.96
- 4 mesh	80.35	57.39	62.00	89.38	79.03	50.42		55.54	73.84	76.07

Because the terrace deposits, which are only 10 to 20 feet above associated drainage, are so near the water table, complete sections have not been observed. Thus, the thickness was acquired from operators' and drillers' logs. These deposits are recovered through the use of drag-line or dredge equipment.

An abandoned pit in the SE¼ Sec. 18, T. 17 N., R. 4 E. (sample 10, table 1), exposed 4 feet of dirty sand and fine gravel (table 2) overlain by 4 feet of alluvial silts and clays. Observation of scattered small piles of bank-run material suggests that the deposit is cleaner and coarser at depth. As its lithologic composition (table 3) is unusually high in chert for Wisconsinan outwash, this may be reworked Illinoian age material.

The pit of Decatur Hydraulic Sand and Gravel Company in the N½ Sec. 21, T. 16 N., R. 2 E., was started in the low terrace at approximately 600 feet and has since migrated to the floodplain (590 feet elevation). Drill records indicate that approximately 40 feet of sand and fine gravel with scattered lenses of coarse gravel overlies till and is overlain by approximately 10 feet of silts and clays. A pebble count on this deposit (sample 7) is shown in table 3. A size analysis was not made because the only material available from the deposit was that recovered by dredge, and, therefore, not representative of the actual deposit.

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

Rock type	Sample number																			
	1		2		3		4		5		6		7		8		9		10	
	Size (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	3/4 x 1/2	1/2 x 3/8
Dolomite	36.9	43.7	54	31.6	38.2	46.2	16.5	37.2	37.3	35.3	30.6	43.8	37.7	38.7	71.2	51.9	51.7	45.3	4.5	4
Limestone	26	15	8	26.5	21.1	13.3	16.5	6.7	7	10.9	7.9	15.2	8.1	12.9	5.7	3.1	3.8	10.6	0	.8
Chert	4.34	11.4	8	10.9	12.8	10.2	9.9	18.6	4.7	12.6	13.2	6.9	21.9	19.7	9.1	11.6	12.5	10.2	38.6	52.8
Graywacke	0	3	1	2.6	0	2.5	3.3	2.7	4.7	4.2	1.3	1.3	7.3	1.5	0	1.2	1.3	4.4	2.3	8
Siltstone and sandstone	23.9	11.4	12	11.6	14	11.4	33	21.3	14	18.4	6.6	5	15.1	7.6	1.1	15.3	12.5	8.8	18.2	13.6
Conglomerate	0	.6	1	0	2	0	0	0	0	.8	21.3	13.8	2.4	0	0	0	1.3	.9	0	0
Shale	0	0	0	0	0	.6	0	4	4.7	3.4	0	0	1.2	1.5	0	.6	0	.9	0	1.6
Ironstone	0	.6	1	1.3	0	2.5	0	0	2.3	1.7	0	1.9	0	0	0	1.2	0	.4	0	0
Dark crystalline	0	3.6	3	5.8	2.3	7.6	6.6	1.3	7	5.9	4	4.4	3.6	2.3	7.8	4.3	2.5	4.4	4.5	8
Granitic	0	3	7	6.5	5.9	2.5	6.6	2.7	2.3	2.5	6.7	5	3.6	9.9	4.5	6.1	3.8	5.3	13.6	6.4
Quartzite	6.5	7.8	4	2.6	4.7	3.2	3.3	4	7	3.4	6.7	1.3	0	4.5	0	3	8.8	6.6	18.2	4
Greenstone	2.2	0	1	.6	0	0	3.3	1.3	0	.8	1.3	1.3	0	1.5	0	1.8	2.5	1.3	0	.8
Till balls	0	0	0	0	0	0	0	0	9.32	0	0	0	0	0	0	0	0	0	0	0
Total percent	97.7	100.1	100.0	100.0	99.0	100.0	99.0	99.8	100.3	99.9	99.6	99.9	100.9	100.1	99.4	100.1	100.7	99.1	99.9	100.0
Total pebbles	46	167	100	155	85	158	30	75	43	119	75	159	82	132	88	164	80	225	44	125

Just west of Decatur, in the SW¼ Sec. 24, T. 16 N., R. 1 E., an infrequently operated pit exposed 5 to 10 feet of stratified clayey silt and silty sand overlying 8 feet of sand and fine to coarse gravel with scattered boulders up to 3 feet in diameter. The presence of abundant striated cobbles and scattered very large boulders, poor stratification of gravel, and a mixture of silts, sands, and gravels with some poorly washed "till-like" material suggests that this is an ice-contact deposit.

At the western margin of the Shelbyville Moraine (pl. 1), on the north side of the Sangamon River, in the SE¼ Sec. 29, T. 16 N., R. 1 E., the Macon County Gravel Company has a drag-line operation recovering material from the low terrace at approximately 590 feet elevation. Here, again, the proximity to the water table made it possible to observe only the upper 14 feet of the section, which is composed of 8 feet of clean, fine, sandy gravel overlain by 6 feet of clayey silt. The operator reports a total sand and gravel thickness of approximately 35 to 40 feet. Size analysis and pebble counts were performed on bank-run material taken from the drag-line bucket (sample 9, table 1).

South of the Sangamon River, in the SE¼ Sec. 32, T. 16 N., R. 1 E. (sample 3, table 1), the Johnson Sand and Gravel Company is recovering sand and gravel by drag-line from the 600-foot terrace level. This terrace is probably a correlative of the 590-foot terrace on the north side of the river; both are depositional in origin but erosional in topographic form—the south-side terrace developed first. The observed outcrop shows approximately 10 feet of overburden with 6 feet of sand and fine to medium gravel beneath approximately 10 feet of overburden. The operator reports 6 to 8 feet of overburden overlying 15 to 18 feet of sand and gravel that is in turn underlain by 4 to 5 feet of blue clay, overlying greater than 40 feet of sand and gravel. The sieve analysis (table 2) shows that approximately 9 percent of this material is greater than 1 inch in diameter.

The deposits described above are thought to continue to the west, but adequate data are not presently available to substantiate this. A power-augered hole in the SW¼ Sec. 24, T. 16 N., R. 1 W., encountered the following sequence. From top to bottom: 3 feet of sandy silt, 3 feet of silty sand with scattered pebbles, 3 feet of sand and fine to coarse gravel. Difficult augering suggested coarse materials at 9 feet. On the basis of this evidence, the area is mapped as a low-terrace deposit on plate 1. A power-augered hole in the SE¼ Sec. 30, T. 16 N., R. 1 E., encountered sand and fine gravel below 22 feet of sand, which suggests that the area mapped as sand dunes (pl. 1) is very likely underlain in part by low-terrace sand and gravel.

Friends Creek, a tributary to the Sangamon River in northeastern Macon County, has a number of low-terrace remnants at an elevation of approximately 650 feet that have been worked for sand and gravel. These pits, however, have long since been abandoned and, consequently, are overgrown with vegetation and covered with slump material. To determine the general thickness and lithologic character of these terrace deposits, a power-auger hole was drilled in the NW¼ NE¼ Sec. 31, T. 18 N., R. 4 E., encountering 9 feet of sand and fine gravel overlain by 3 feet of silt and underlain by till (sample 5, table 1). Approximately 80 percent of this material is less than 4 mesh in grain size (table 2).

Long, Big, and Finley Creeks, in southeastern Macon County, have terrace remnants that contain sand and gravel (pl. 1). However, the deposits are predominantly sand, and the gravel is generally fine grained (pea size). No stationary equipment is located in any of the pits in this area, and although some of the ma-

terial is frequently used for fill, none is presently being used as aggregate for asphalt or concrete. One abandoned operation in the SE¼ NE¼ SW¼ Sec. 32, T. 16 N., R. 3 E., is composed of material about 42 percent greater than 4 mesh, which is relatively coarse for the area (sample 2, table 1).

Near the confluence of Long and Big Creeks, in the NW¼ Sec. 33, T. 16 N., R. 3 E., materials are being recovered by drag-line from a terrace ranging from 620 to 640 feet in elevation. Approximately 10 feet of sand and fine gravel underlies 4 to 6 feet of clayey silt (sample 4, table 1). The thickness of the deposit is unknown.

A number of pits located on Stevens Creek just west of Decatur were described by Brown (1930) as high-terrace deposits. As a result of extensive residential development along this stream, well exposed outcrops do not exist and sand and gravel pits are no longer present. Thus, it is difficult to determine whether or not natural terraces are present. Well developed topographic levels, which seem to be terraces, are found in the SE¼ Sec. 22, T. 17 N., R. 2 E., at an elevation of 650 feet, and in the SE¼ Sec. 33, T. 17 N., R. 2 E., at an elevation of 630 to 640 feet. This suggests that the stream that developed these levels had a gradient of approximately 10 feet per mile. If this gradient is projected to the Sangamon River, it is found to correspond with the 600-foot low terrace. The terraces along Stevens Creek, therefore, are mapped as low terraces (pl. 1). Thickness information was gathered from only one Illinois Division of Highways (District 5) test boring located on the low terrace (620 feet elevation) in the NE¼ Sec. 8, T. 16 N., R. 2 E. Approximately 6 feet of sand and fine gravel was found underlying 4 feet of silty clay. The limited number of scattered outcrops contain till, some of which was exceptionally gravelly. The information presently available suggests that the sand and gravel pits (which were quite small) were probably located in poorly developed isolated pockets, which have since been abandoned because of their limited vertical and lateral extent.

In northwestern Macon County, a number of abandoned pits are located in the low terrace of North Fork. In the northwest corner of Sec. 14, T. 18 N., R. 1 E., approximately 3 feet of sand and fine gravel was observed underlying approximately 6 feet of overburden. The thickness of this sand and gravel deposit along North Fork is unknown.

Alluvium Overlying Glacial Sand and Gravel

Apparently most of the Sangamon River post-glacial alluvium is underlain by varying thicknesses of outwash sands and gravels of glacial origin, but little is actually known about the thickness or physical characteristics of the material. Two well logs from the low terrace (10 feet above the Sangamon River floodplain) near the center of Sec. 22, T. 16 N., R. 2 E., show approximately 40 feet of sand and gravel underlying 10 feet of alluvium (sand and organic silt and clay). A well in the SW¼ SE¼ SE¼ Sec. 17, T. 16 N., R. 2 E., penetrated 5 feet of alluvium overlying 28 feet of sand and gravel.

A boring by the Illinois Division of Highways (District 5) in the floodplain in the NE¼ SE¼ Sec. 24, T. 16 N., R. 1 E., penetrated 12 feet of silty clay overlying 29 feet of sand and fine gravel. Another test hole in the SW¼ NE¼ SE¼ Sec. 8, T. 16 N., R. 3 E., encountered 22 feet of sand and fine gravel underlying 8 feet of Sangamon River alluvium. Auger tests performed by the Macon County Gravel Company in the north half of Sec. 32, T. 16 N., R. 1 E., show that only sand was encountered in the Sangamon River floodplain.

Tributary streams of the Sangamon River, such as Stevens, Long, Big, Finley, Sand, Spring, and Friends Creeks, also contain varying amounts of sand and fine gravel below the alluvium, particularly in their lower reaches. Because of the proximity of the floodplain alluvium and underlying sand and gravel to the water table, little is known about the character of these materials. In the floodplain of Stevens Creek (SW¼ SW¼ Sec. 27, T. 17 N., R. 2 E.), a boring by the Illinois Division of Highways (District 5) encountered 13 feet of silty clay overlying 4 feet of sand and gravel. On a tributary of Stevens Creek, in the SE¼ NE¼ NW¼ Sec. 3, T. 16 N., R. 2 E., a conspicuously thick section of sand and sand and fine gravel (40 feet) was penetrated by a state highway engineering test hole. The sand is overlain by approximately 3 feet of silty clay. The relationship of this deposit to that found in Stevens Creek is unknown. Because this magnitude of sand thickness has not been reported from borings in the local area, the origin of this material may be ice-contact rather than fluvial.

A pit recently opened in the Big Creek floodplain (SW¼ SW¼ NE¼ Sec. 2, T. 15 N., R. 3 E.) exposed approximately 4 feet of black organic silt above 2 feet of dirty gravel overlying blue-gray sand and fine gravel (sample 8, table 1). As the material is below the water table, the actual thickness is unknown; however, the sand and gravel is reported to be greater than 12 feet thick.

Sand and gravel probably underlies Willow Branch and Mosquito Creek in southwestern Macon County, as demonstrated by a Illinois Division of Highways (District 5) test boring on Willow Branch near the center of Sec. 8, T. 14 N., R. 2 E., which encountered more than 21 feet of sand and fine gravel underlying 10 feet of alluvium.

Little is known about the thickness or character of the sand and gravel that possibly underlies the alluvium of Mosquito Creek except that it has been encountered by borings made by the Illinois Division of Highways (District 5) along this creek in Christian County.

Sand and Gravel Overlain by Glacial Till

Sand and gravel crops out beneath glacial till in the Sangamon Valley bluff at abandoned sand and gravel pits in the SW¼ SW¼ NE¼ Sec. 20, T. 16 N., R. 2 E. The maximum thickness of the exposed deposit is approximately 20 feet; the till overburden averages about 15 feet. Because no subsurface information is available in the immediate area of the upland, the extent of this deposit southward beneath the till is unknown. Even though this stratigraphic sequence has not been observed at other localities along the Sangamon River, it possibly may be present but unexposed. The deposit in the NW¼ SE¼ NE¼ Sec. 19, T. 16 N., R. 2 E., may be of this type. However, it has been so extensively worked and moved around by man that its original character is unrecognizable.

Information gathered from borings made by the Illinois Division of Highways (District 5) on the bluffs of Lake Decatur, west of Decatur, suggests a stratigraphic sequence very similar to that described above. In the SW¼ NE¼ SW¼ Sec. 8, T. 16 N., R. 3 E., a boring encountered 3 feet of loess overlying 11 feet of till, overlying 6 feet of coarse sand and gravel, which overlies till. Another boring in the SW¼ Sec. 9, T. 16 N., R. 3 E., penetrated a very similar sequence.

The deposits indicated by the borings and the sand and gravel pits in Sec. 20, described above, may represent an outwash plain, which was overridden by the glacier. There is a possibility, however, that the till overlying the sand and gravel may be of mud-flow origin.

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 southwestern Macon County, west and southwest of the Shelbyville Moraine (pl. 1), and are the product of an earlier stage of glaciation (Illinoian). The hills west of Blue Mound, in Sec. 31, T. 15 N., R. 1 E., are kames, whereas the linear ridge trending NE-SW from Sec. 36, T. 15 N., R. 1 E., to Sec. 16, T. 14 N., R. 1 E., and the arcuate ridge trending generally west from Sec. 14, T. 14 N., R. 1 E., across the Macon County line, are probably ice-channel (large cracks in the ice) fillings. The hills and ridges of Illinoian sand and gravel in Macon County probably correlate with similar deposits called Hagarstown beds by Jacobs and Lineback (1969) in Fayette County.

The gravel pit in the kame west of Blue Mound (Sec. 31) exposes approximately 30 feet of gravel overlain by silt and clay varying in thickness from 1 to 12 feet. The character of the sand and gravel is extremely variable and displays an interlayering of coarse gravel and cobbles, sand, silty sand, and wedges and inclusions of till. Because of the presence of till and firmly cemented gravel layers, the economic value of this deposit is limited (sample 6, table 1).

A power-auger hole on the linear ridge in the NW$\frac{1}{4}$ SW$\frac{1}{4}$ Sec. 10, T. 14 N., R. 1 E., encountered weathered sand and gravel. The presence of the thick (14-foot) zone of weathering and leaching on this older drift may make recovery of the underlying clean sand and gravel uneconomic.

Power augering showed that the large hill in Secs. 13 and 14, T. 14 N., R. 1 E., is composed of water-laid fine to coarse sands underlying 5 to 12 feet of soil and silt. Although this hole and the one described immediately above were augered to a depth of 20 feet, material coarser than sand was not penetrated. However, the existence of such material here is not ruled out.

The thickness of the sand and gravel in these hills and ridges is unknown, but Hunter and Kempton (1967, p. 11) suggest that the approximate maximum thickness of these types of deposits equals the relief of the topographic form. This generally may be true for the kames, but the power-auger hole in the linear ridge in Sec. 10 was still in sand and gravel at a depth equal to twice the height of the ridge. The thickness of these ridge deposits and their relation to adjacent sediments may indicate their mode of origin, which would ultimately provide information for more intelligent exploration of these Illinoian deposits as sand and gravel resources.

Small mounds and pockets of sand and gravel are also scattered over the Shelbyville drift plain (pl. 1). One of the more prominent mounds is located in the SE$\frac{1}{4}$ SE$\frac{1}{4}$ Sec. 27, T. 17 N., R. 2 E. Even though this deposit has been worked, the exposure is so poor that reliable samples could not be obtained. Observations made on the slump material suggest that the deposit is made up predominantly of sand and fine gravel.

Deposits that very likely are ice-contact in origin occur from 630 to 660 feet in elevation scattered along the Sangamon River in the SW$\frac{1}{4}$ NW$\frac{1}{4}$ SE$\frac{1}{4}$ Sec. 27, T. 16 N., R. 1 E.; the NE$\frac{1}{4}$ SE$\frac{1}{4}$ NE$\frac{1}{4}$ Sec. 19, T. 16 N., R. 2 E.; the SE$\frac{1}{4}$ NE$\frac{1}{4}$ NW$\frac{1}{4}$ Sec. 30, T. 17 N., R. 4 E.; and the NW$\frac{1}{4}$ SE$\frac{1}{4}$ NE$\frac{1}{4}$ Sec. 16, T. 17 N., R. 4 E. The deposits, exposed in abandoned sand and gravel pits, are composed of poorly sorted sand and gravel interstratified with bedded silts and till-like material and are apparently discontinuous in lateral and vertical distribution.

Outwash Plains

Outwash plains include the following three areas shown on plate 1: (1) northwestern Macon County, west of the Shelbyville Moraine and north of the Sangamon River; (2) southwestern Macon County, west of the Shelbyville Moraine and south of the Sangamon River; and (3) central Macon County, southeast of Decatur, west and northwest of the Cerro Gordo Moraine.

In northwestern Macon County, the parallel configuration of contour lines with the moraine boundary suggests that this area is an outwash plain. However, where sand and gravel has been encountered west of the Shelbyville Moraine by power auguring—as in the southwest corner of Sec. 8, T. 17 N., R. 1 E.; the northwest corner of Sec. 20, T. 17 N., R. 1 E.; the southeast corner of Sec. 25, T. 17 N., R. 1 W.; the SW¼ NW¼ NW¼ Sec. 2, T. 16 N., R. 1 W.; and the SE¼ SW¼ NE¼ Sec. 11, T. 16 N., R. 1 W.—the deposits occur predominantly as sand with scattered fine gravel less than 5 feet in thickness underlying 5 to 15 feet of silt and clay. In the NE¼ SW¼ NW¼ Sec. 13, T. 16 N., R. 1 W., and in the SW¼ SW¼ NW¼ Sec. 18, T. 16 N., R. 1 E., approximately 10 feet of silts and silty sands were found overlying weathered clayey silts of Illinoian age.

Considerable thicknesses of sand and gravel are present in certain areas of the outwash plain, as demonstrated by a hole power augered in the NW¼ NW¼ SW¼ Sec. 18, T. 17 N., R. 1 E., in a drainage channel of South Lake Fork. Here, more than 6 feet of sand and fine gravel were encountered underlying 8 feet of clayey silts and silty sands. Likewise, a driller's log from the SE¼ NW¼ Sec. 29 reported 19 feet of sand and gravel underlying 10 feet of silt and sand.

Immediately south of the Sangamon River and west of the Shelbyville Moraine, the outwash plain is poorly developed. With the exception of an alluvial fan southwest of Macon and the linear ridges of Illinoian age (pl. 1), no sand and gravel was encountered more than 4 feet thick. The linear ridges were discussed above under "Hills (Kames) and Ridges (Ice-Channel Fillings) of Sand and Gravel."

From observations made at a number of outcrops and test borings, it appears that little or no outwash plain was developed northwest of and marginal to the Cerro Gordo Moraine (pl. 1). The large area labeled as outwash plain by Krumbein (1930) is not supported by the findings in this study. The sand and gravel in the area of the Cerro Gordo Moraine is restricted for the most part to Long, Big, and Finley Creeks, which have been discussed previously.

Other Sand and Gravel

Two particular types of geomorphic forms, re-entrants and alluvial fans, previously have been ignored as a possible source of sand and gravel. In this report, however, considerable attention was given to these features, which occur along the front of the Shelbyville Moraine.

The two distinct areas of sand and gravel concentration associated with re-entrants occur north of the Sangamon River in parts of Secs. 25, 26, 35, and 36, T. 18 N., R. 1 E., and parts of Secs. 16, 20, and 21, T. 16 N., R. 1 E. The actual thickness of the sand and gravel is unknown; however, a hole augered in the southeast corner of Sec. 26, T. 18 N., R. 1 E., penetrated 7 feet of silts and clays overlying more than 6 feet of sand and fine gravel. A hole augered in the other re-entrant near the center of Sec. 16, T. 16 N., R. 1 E., encountered more than 5 feet of sand and fine gravel overlain by approximately 8 feet of silts and clays. Further exploration may prove that these areas contain thick and extensive sand and gravel deposits.

The alluvial fan that occurs west of Macon covers 6 to 8 square miles, including parts of Secs. 35 and 36, T. 15 N., R. 1 E.; Secs. 1 and 12 and parts of Secs. 2, 11, and 13, T. 14 N., R. 1 E.; part of Sec. 31, T. 15 N., R. 2 E.; and Sec. 6 and parts of Secs. 5, 7, 8, 9, 16, 17, and 18, T. 14 N., R. 2 E. Several auger borings in this fan-shaped topographic feature demonstrate that the entire area is underlain by sand and fine gravel. The overburden, which ranges from 8 to 16 feet in thickness, is composed of 4 to 12 feet of till-like material and is blanketed by approximately 4 feet of silt (loess). The till-like material was described and interpreted as a mud-flow by Hester and DuMontelle (1969). The absence of sand and gravel in a hole augered immediately east of Dry Branch, in the SW$\frac{1}{4}$ SE$\frac{1}{4}$ SW$\frac{1}{4}$ Sec. 2, T. 14 N., R. 1 E., demonstrated that this deposit is in part delimited by Dry Branch.

Because of the restricted depth capabilities of the augering rig used in this study, the actual thickness of the underlying sand and gravel in most of the area covered by the alluvial fan is unknown. A hole drilled by the Illinois Division of Highways (District 5) for this study in the NE$\frac{1}{4}$ NE$\frac{1}{4}$ SE$\frac{1}{4}$ Sec. 1, T. 14 N., R. 1 E., encountered 12 feet of sand and fine gravel underlying the till-like material and overlying Wisconsinan till. A projection of gradients on a cross section drawn from east to west in this area strongly suggests that the sand and gravel deposit probably has a maximum thickness of about 15 feet. A boring by the Illinois Division of Highways (District 5) located on Willow Branch, in the SE$\frac{1}{4}$ NW$\frac{1}{4}$ Sec. 8, T. 14 N., R. 2 E., which cuts through the alluvial fan, encountered more than 21 feet of sand and fine gravel underlying 10 feet of overburden. The relationship of this sand and gravel to that of the rest of the alluvial fan is presently unknown.

The only information available on the size distribution and lithologic character of the sand and gravel in this area comes from an abandoned pit in the NE$\frac{1}{4}$ Sec. 13, T. 14 N., R. 1 E. (sample 1, table 1). This deposit, 6 feet of which was exposed, had approximately 80 percent material less than 4 mesh and is overlain by 5 feet of clayey silt.

Although little is known concerning the actual thickness distribution, particle size, and lithology of the above deposit, this area is considered promising for further investigation as a sand and gravel resource.

Dune Sands

West of the Shelbyville Moraine and north of the Sangamon River, large linear bodies of sand, trending northwest-southeast, are mapped as dunes (pl. 1). A power-auger hole in the NW$\frac{1}{4}$ NW$\frac{1}{4}$ SE$\frac{1}{4}$ Sec. 30, T. 16 N., R. 1 E., encountered 20 feet of fine to medium sand overlying sand and fine gravel of unknown thickness.

The sand comprising these dunes, which are located at a general elevation of 600 to 610 feet, was probably originally water-laid, representing a slightly higher level of deposition of the Sangamon River. The upper portion appears to have been reworked by the wind, so that many of the surface forms are aeolian in origin.

Areas Devoid of Sand and Gravel

The pattern on plate 1 shown as "generally devoid of sand and gravel" depicts areas of glacial till overlain by a veneer of loess that ranges in thickness from 1 to 12 feet and averages 5.1 feet for 67 measured localities. Sand and gravel de-

posits that are very limited in vertical and lateral extent have been observed and worked, in some cases, as in the NE¼ NE¼ NW¼ Sec. 30, T. 17 N., R. 4 E. Because these deposits are small and commonly interstratified with beds of silts and wedges of till-like material, they have been used only locally.

Water-well borings and deep foundation tests also have encountered sand and gravel in many localities underlying or interbedded with glacial till, but the limited thickness of the gravel or the excessive depth makes recovery economically impractical at present.

Sand and Gravel Industry

Three sand and gravel operators account for the majority of the sand and gravel produced in Macon County. Their pits are located in the low terrace and in valley train deposits below the alluvium of the Sangamon River. Gravel pits that were in operation during the fall of 1968 appear in table 4. The first three

TABLE 4 - SAND AND GRAVEL PRODUCERS HAVING FIXED EQUIPMENT IN MACON COUNTY

Company name	Location	Type of deposit
Decatur Hydraulic Sand and Gravel Company, Inc.	NE¼ Sec. 21, T. 16 N., R. 2 E.	Low terrace and floodplain of Sangamon River
Macon County Sand and Gravel, Inc.	SE¼ Sec. 29, T. 16 N., R. 1 E.	Low terrace of Sangamon River
Johnson Sand and Gravel Company, Inc.	SE¼ Sec. 32, T. 16 N., R. 1 E.	Low terrace of Sangamon River
Herman Brozio	NE¼ Sec. 19, T. 16 N., R. 2 E.	Low terrace of Sangamon River
Ben King	NW¼ Sec. 33, T. 16 N., R. 3 E.	Low terrace of Long Creek
Mosquito Township	SW¼ Sec. 31, T. 15 N., R. 1 E.	Kame
C.E. Burgett Construction Company	NE¼ Sec. 2, T. 15 N., R. 3 E.	Floodplain of Big Creek

are the major and the last four are the minor producers. Location of known pits, including those that are abandoned or worked only periodically, are shown on plate 1.

CONCLUSIONS

From the field and laboratory work performed for this report, the following conclusions may be drawn:

(1) The greatest number of gravel deposits occur in the low-level terrace and the floodplain of the Sangamon River.

(2) Deposits of sand and fine gravel marginal to the Shelbyville Moraine, which have been buried by mud-flow or

flow-tills (like that described just west of Macon), may be widespread.

(3) Re-entrants, which serve as coarse sediment traps, deserve further investigation as sources of sand and gravel.

(4) The sand and gravel deposits of Macon County are predominantly sand with fine gravel. The range of grain sizes is as follows:

-4 mesh	50 - 89 percent
+4 mesh	10 - 42 percent
+1 inch	0 - 16 percent

(5) The paucity of coarse gravels greater than 1 inch in diameter is directly related to the limited quantity of the same size fraction of the Shelbyville and Cerro Gordo tills. Pebble lithology and grain size data of the tills are useful for preliminary sand and gravel exploration.

(6) The abundance of chert and the relative absence of carbonates in certain areas suggest that these deposits resulted from the reworking of Illinoian sediments.

REFERENCES

Broadhead, G. C., 1875, Geology of Moultrie, Macon and Piatt Counties, in Worthen, A. H., et al., Geology and paleontology: Geol. Survey of Illinois, Vol. VI, p. 185-196.

Brown, C. A., 1930, Report on western Macon County: Illinois Geol. Survey Misc. Ms. #81, Road Material Resources Repts., unpubl. ms. on open file, p. 633-648.

Hester, N. C., and P. B. DuMontelle, 1969, A Pleistocene mud-flow along the Shelbyville Moraine front, Macon County, Illinois (abs.): North-Central Sec. Mtg., May, Geol. Soc. America, Columbus, Ohio.

Horberg, C. L., 1953, Pleistocene deposits below the Wisconsin drift in northeastern Illinois: Illinois Geol. Survey Rept. Inv. 165, 61 p.

Hunter, R. E., and J. P. Kempton, 1967, Sand and gravel resources of Boone County, Illinois: Illinois Geol. Survey Circ. 417, 14 p.

Jacobs, A. M., and J. A. Lineback, 1969, Glacial geology of the Vandalia, Illinois, region: Illinois Geol. Survey Circ. 442, 24 p.

Krumbein, W. C., 1930, The gravel resources of the eastern half of Macon County, Illinois: Illinois Geol. Survey Misc. Ms. #81, Road Material Resources Repts., unpubl. ms. on open file, p. 627-632.

Leighton, M. M., 1921, The glacial history of the Sangamon River valley at Decatur and its bearing on the reservoir project: Illinois Acad. Sci. Trans., v. 14, p. 213-218.

Leverett, Frank, 1899, The Illinois glacial lobe: U.S. Geol. Survey Mon. 38, 817 p.

Smith, R. S., E. A. Norton, E. E. DeTurk, F. C. Bauer, and L. H. Smith, 1929, Macon County soils: Univ. Illinois Agr. Exp. Sta. Soil Rept. 45, 67 p.

Illinois State Geological Survey Circular 446
16 p., 1 pl., 1 fig., 4 tables, 2200 cop., 1969

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

CIRCULAR 446

ILLINOIS STATE GEOLOGICAL SURVEY

URBANA 61801