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SAND AND GRAVEL RESOURCES OF MASON COUNTY, ILLINOIS

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ABSTRACT

In Mason County there are two distinct physiographic regions containing sand and gravel. The first region comprises the lowlands and terraces of the Illinois River, which are composed of glacial outwash deposited by meltwaters from the retreating Wisconsinan glaciers. Later floodwaters eroded terraces into these deposits of coarse sand and fine gravel. On top of these terraces are sand dunes, consisting of medium to fine sand, which are possible sources of "blend sand."

The second area consists of uplands in the southeast part of the county. These are made up of Illinoian glacial till that contains local pockets of sand and gravel. The uplands are also mantled with windblown sand that is considerably finer than the sand on the terraces; this upland sand meets "blend sand" specifications.

The distribution of these deposits is mapped on the scale 1:62,500 on plate 1 (in pocket).

INTRODUCTION

The large amount of highway construction and improvement in Illinois requires an increasing development of aggregate resources, either limestone or sand and gravel. Because Mason County is situated on outwash filling a deep bedrock valley, the discovery of limestone at a shallow depth is considered unlikely there. This report, part of a continuing program by the Illinois State Geological Survey to provide information about the distribution, thickness, and character of sand and gravel deposits in Illinois (fig. 1), discusses the distribution and nature of the sand and gravel deposits in Mason County and the possiblity of their use as construction material. Observations were made of all accessible sand or sand and gravel pits and samples were taken from a number of these and from various outcrop and power-auger localities (table 1). At the time of the study, only one commercial pit was active.

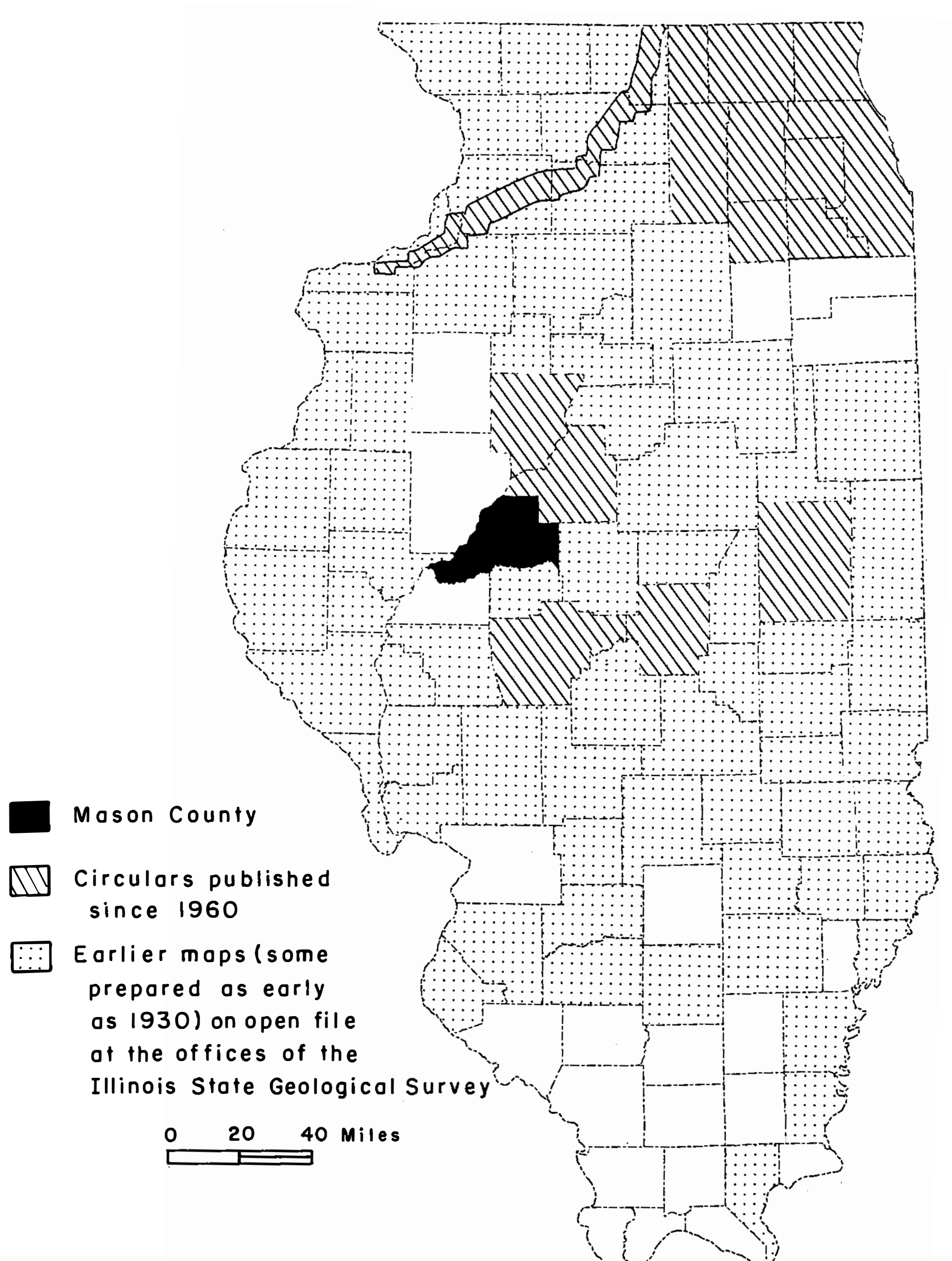

Fig. 1 - Index map showing Mason County and other areas where sand and gravel resources have been mapped.

TABLE 1 - LOCATIONS OF SAMPLES FROM MASON COUNTY

Sample no.	Location						Thickness interval (ft)	Kind of deposit
	¼	¼	¼	Sec.	T.	R.		
1	NE	NE	NE	30	21N	5W	4–8	windblown sand on upland
2	SW	SW	NW	14	21N	5W	5–6	windblown sand on upland
3	NE	NE	NE	11	21N	5W	0–10	outwash in upland
4	SW	NE	NE	2	21N	5W	—	outwash in upland
5	SE	SW	SW	4	21N	5W	15–20	outwash in upland
6	SE	SW	SW	4	21N	5W	0–10	windblown sand on upland
7*	NE	NW	NW	33	23N	5W	—	sand dune on terrace
8*	SW	SE	SW	22	23N	5W	10–15	outwash in terrace
9	SW	SW	SE	33	22N	6W	—	sand dune on terrace
10	NE	SE	NW	14	20N	7W	4–7	sand dune on terrace
11	NW	SE	SE	26	20N	7W	0–20	outwash in upland
12	SW	SE	NW	34	21N	6W	5–20	windblown sand on upland
13	SW	SE	NW	34	21N	6W	6–10	windblown sand on upland
14	NE	SE	NE	2	20N	5W	0–1	point bar in river
15a	SW	NE	SW	10	20N	6W	0–4	windblown sand on upland
15b	SW	NE	SW	10	20N	6W	5–7½	windblown sand on upland
16	SW	NW	NW	18	20N	6W	7–8	windblown sand on upland
17a	SW	SW	SE	2	20N	7W	0–3	sand dune on terrace
17b	SW	SW	SE	2	20N	7W	9–11	sand dune on terrace
18a	NE	NE	NW	4	20N	7W	4–5	sand dune on terrace
18b	NE	NE	NW	4	20N	7W	12–17	sand dune on terrace
19	SE	SE	NE	5	20N	7W	7–10	sand dune on terrace
20a	NE	NE	NE	36	21N	8W	5–10	sand dune on terrace
20b	NE	NE	NE	36	21N	8W	10–15	sand dune on terrace
21	NW	NE	NW	3	20N	6W	3–9	windblown sand on upland
22	NE	NW	NW	30	22N	6W	12–13	sand dune on terrace
23	NE	NE	NE	1	22N	7W	6–7	sand dune on terrace
24a	SE	SE	SE	21	23N	7W	0–5	sand dune on terrace
24b	SE	SE	SE	21	23N	7W	10–20	sand dune on terrace

*Sample from Tazewell County.

Grain-size distribution was determined by sieving (table 2). The compositions of the larger pebbles (3/4-3/8 in. diameter) were determined by inspection, and their frequency distribution was obtained by counting different varieties (table 3). Additional information was obtained from well cuttings and well logs in the files of the Illinois State Geological Survey. A map showing the distribution of the sand and gravel in the county was prepared (pl. 1).

Previous Study

There have been numerous investigations of the geology and resources of west-central Illinois, but most of them either are regional studies covering Mason County in only a general way or are detailed studies of areas neighboring the county. The geology of west-central Illinois was described regionally as early as 1870 by H. M. Bannister, who recognized the abundance of drift and gravelly floodplain deposits along the Illinois River system as well as the scarcity of rock outcrops. However, he mentioned only in passing the possibility of the use of sand as a building resource. In 1899, Frank Leverett, in his description of the glaciation in Illinois, discussed briefly the thickness and distribution of the drift in Mason County, but he did not describe the Pleistocene deposits there in any detail.

TABLE 2 - SIEVE ANALYSES OF MASON COUNTY SAND AND SAND AND GRAVEL

Sample number

Column A - percent retained; Column B - percent passing

U. S. standard sieve number	1		2		3		4		5		6		7*		8*		9		10		11		12		13		14	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
2 inch					0	100	14.8	85.2	0	100					2.0	98.0					0	100					0.0	100
1½ inch					0	100	0	85.2	0	100					2.5	95.5					0	100					0.0	100
3/4 inch					1.9	98.1	5.8	79.4	1.6	98.4					12.5	83.0					0.1	99.9					0.8	99.2
3/8 inch					4.2	93.9	5.7	73.7	3.0	95.4					12.2	70.8					1.2	98.7					11.8	87.4
4					17.2	76.7	9.2	64.5	7.8	87.6					16.6	54.2					2.3	96.4					19.2	68.2
8					4.1	72.6	4.7	59.8	10.1	77.5					12.5	41.7					2.0	94.4	0	100.0	0	100.0	19.4	48.8
10	0	100	0	100	1.0	71.6	1.0	58.8	3.6	73.9	0	100	0	100	3.4	38.3	0	100	0	100	0.8	93.6	0	100.0	0	100.0	4.4	44.4
16	0	100	0	100	3.9	67.7	4.4	54.4	13.0	60.9	0	100	0	100	9.5	28.8	0	100	0	100	3.5	90.1	0	100.0	0	100.0	10.8	33.6
40	0.9	99.1	0.4	99.6	40.8	26.9	26.4	28.0	48.4	12.5	2.2	97.8	9.6	90.4	20.8	8.0	7.6	92.4	0.1	99.9	30.3	59.8	1.4	98.6	1.8	98.2	23.5	10.1
50	5.8	93.3	2.7	96.9	13.7	13.2	13.2	14.8	6.1	8.4	10.5	87.3	21.0	69.4	4.2	3.8	29.3	63.1	1.0	98.9	26.0	33.8	4.9	93.7	3.8	94.4	7.2	2.9
80	33.0	60.3	23.2	73.7	10.1	3.1	12.1	2.7	3.0	3.4	36.9	50.4	29.2	40.2	2.4	1.4	52.0	11.1	15.9	83.0	30.0	3.8	47.1	46.6	29.7	64.7	2.3	0.6
100	15.5	44.8	14.1	59.6	1.3	1.8	1.3	1.4	0.3	3.1	13.1	37.3	9.4	30.8	0.3	1.1	6.1	5.0	15.2	67.8	2.6	1.2	24.9	21.7	20.9	43.8	0.2	0.4
200	34.4	11.4	44.9	4.7	0.9	0.9	0.8	0.6	0.7	2.4	27.5	9.8	26.6	4.2	0.3	0.8	4.6	0.4	56.3	11.5	0.7	0.5	19.4	2.3	36.5	7.3	0.2	0.2
Pan	11.4		4.7		0.8		0.6		2.5		9.8		4.2		0.6		0.4		11.5		0.6		2.3		7.3		0.2	
Total	100.0		100.0		99.9		100.0		100.1		100.0		100.0		99.8		100.0		100.0		100.1		100.0		100.0		100.0	
+ 1½ inch	0		0		0		14.8		0		0		0		4.5		0		0		0		0		0		0	
+ 4 mesh	0		0		23.3		35.5		12.4		0		0		45.8		0		0		3.6		0		0		31.8	
- 4 mesh	100		100		76.7		64.5		87.6		100		100		54.2		100		100		96.4		0		0		68.2	

*Sample from Tazewell County.

TABLE 3 - PEBBLE COUNTS OF GRAVEL SAMPLES (PERCENT BY NUMBER OF PEBBLES)

	Sample number									
	3		4		5		8*		11	
	Size (inches)									
Rock type	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	31.7	39.9	26.5	35.6	27.3	25.3	42.2	43.6	20.0	22.3
Limestone	19.0	10.5	20.6	11.1	12.1	10.3	6.7	14.0	30.0	22.3
Chert	6.3	15.4	20.6	12.2	9.1	33.3	8.9	19.0	—	15.6
Sandstone	3.2	7.0	5.9	11.1	3.0	9.2	22.2	2.8	20.0	4.4
Siltstone	4.8	2.1	—	2.2	—	3.4	—	7.0	—	—
Shale	1.6	2.1	—	1.1	—	2.3	—	—	—	—
Ironstone concretions	1.6	0.7	—	—	—	—	11.1	0.7	—	—
Quartzite	7.9	6.3	11.8	10.0	18.2	5.7	4.4	1.4	10.0	6.7
Graywacke	9.5	6.3	5.9	4.5	6.1	1.2	—	1.4	—	4.4
Conglomerate	—	—	—	—	—	—	—	1.4	—	—
Granite	1.6	7.0	—	2.2	6.1	3.4	2.2	4.2	—	4.4
Rhyolite	3.2	0.7	—	4.5	—	—	—	—	—	4.4
Gabbro-diorite	3.2	1.4	—	—	—	1.2	2.2	—	—	—
Trachyte-andesite	—	0.7	2.9	—	—	—	—	—	—	—
Diabase	3.2	—	—	2.2	15.2	3.4	—	4.2	—	2.3
Gneiss	—	—	—	—	3.0	—	—	—	—	—
Sand grain aggregate	1.6	—	5.9	2.2	—	—	—	—	20.0	13.0
Mudstone	1.6	—	—	1.1	—	1.2	—	—	—	—
Total percent	100.0	100.1	100.1	100.0	100.1	99.9	99.9	99.7	100.0	99.8

*Sample from Tazewell County.
†Only 10 pebbles available.

The soil types and distribution in Mason County were described by R. S. Smith et al. (1924), but with emphasis placed on agricultural possibilities. The sands of the uplands in the southeastern part of the county were discussed by Willman (1939) in his report on the fine-grained molding sand resources of northern Illinois. Willman (1942) listed the analyses of seven sand samples from Mason County and discussed the type and size of each deposit and the possibility of its development, primarily as a feldspar resource. The ground-water resources (as well as geography, physiography, and a number of stratigraphic-section descriptions) of the Havana region were studied by Walker, Bergstrom, and Walton (1965). The sand and gravel resources of Tazewell County, the neighboring county to the north, were mapped by R. E. Hunter (1966).

H. R. Wanless (1957) described in detail the geology and resources of the Beardstown, Glasford, and Havana Quadrangles, which include part of Mason County. Contributions to Pleistocene geology involving Mason County include those by W. H. Johnson (1964) and Willman and Frye (1970).

On open file at the Illinois State Geological Survey are a brief report and accompanying map of the road materials resources of Mason County by H. A. Sellin (1930).

TYPES OF DEPOSITS

Mason County lies on a deep, buried bedrock valley filled with 200 to 300 feet of glacial material. This material of Pleistocene age consists of gravels, sands, silts, and clays deposited by ice, water, and wind (fig. 2).

Mason County lies beyond the extent of the Wisconsinan, or most recent, glaciation, but it was covered by glaciers during the Illinoian period and till was deposited at that time. More recently, during the Wisconsinan glaciation, much of the Illinoian drift in Mason County was eroded by the meltwaters of the glaciers on the northeast. Now covering this area are outwash materials derived from the retreating Wisconsinan glacier.

The following is a discussion of the different types of deposits, their nature, and the time of their deposition (fig. 3).

Tills (Hulick and Radnor Members of the Glasford Formation)

Till, an ice-laid deposit, is a heterogeneous mixture of clay, silt, sand, gravel, and boulders. In Mason County there are two tills with interlayered outwash deposits that were deposited by Illinoian glaciers (fig. 4). These two tills

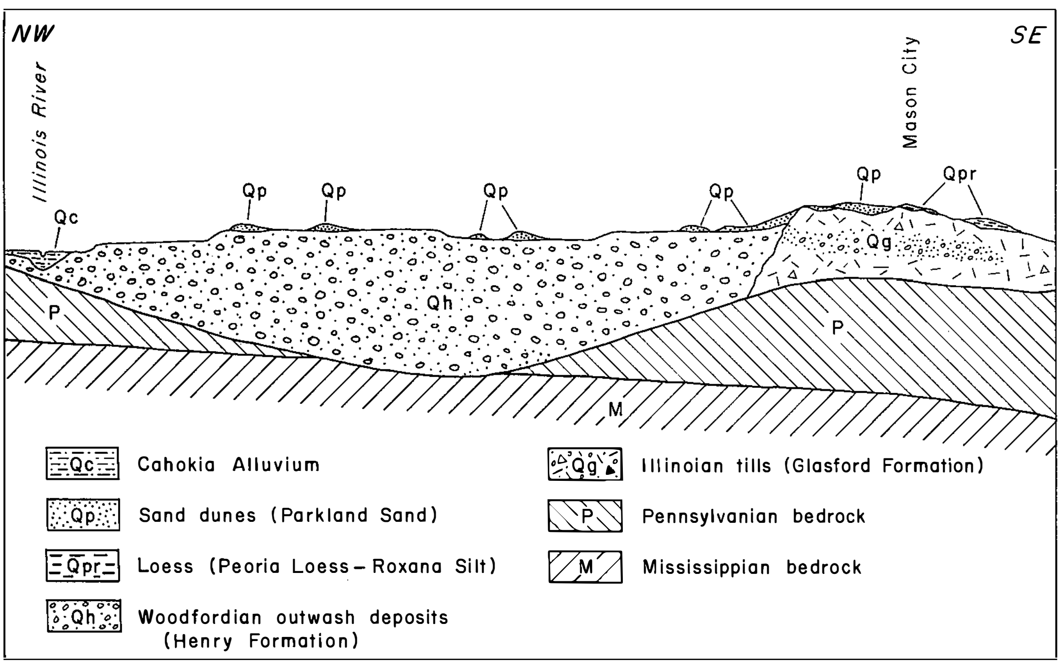

Fig. 2 - Generalized NW-SE cross section of Mason County (not drawn to scale).

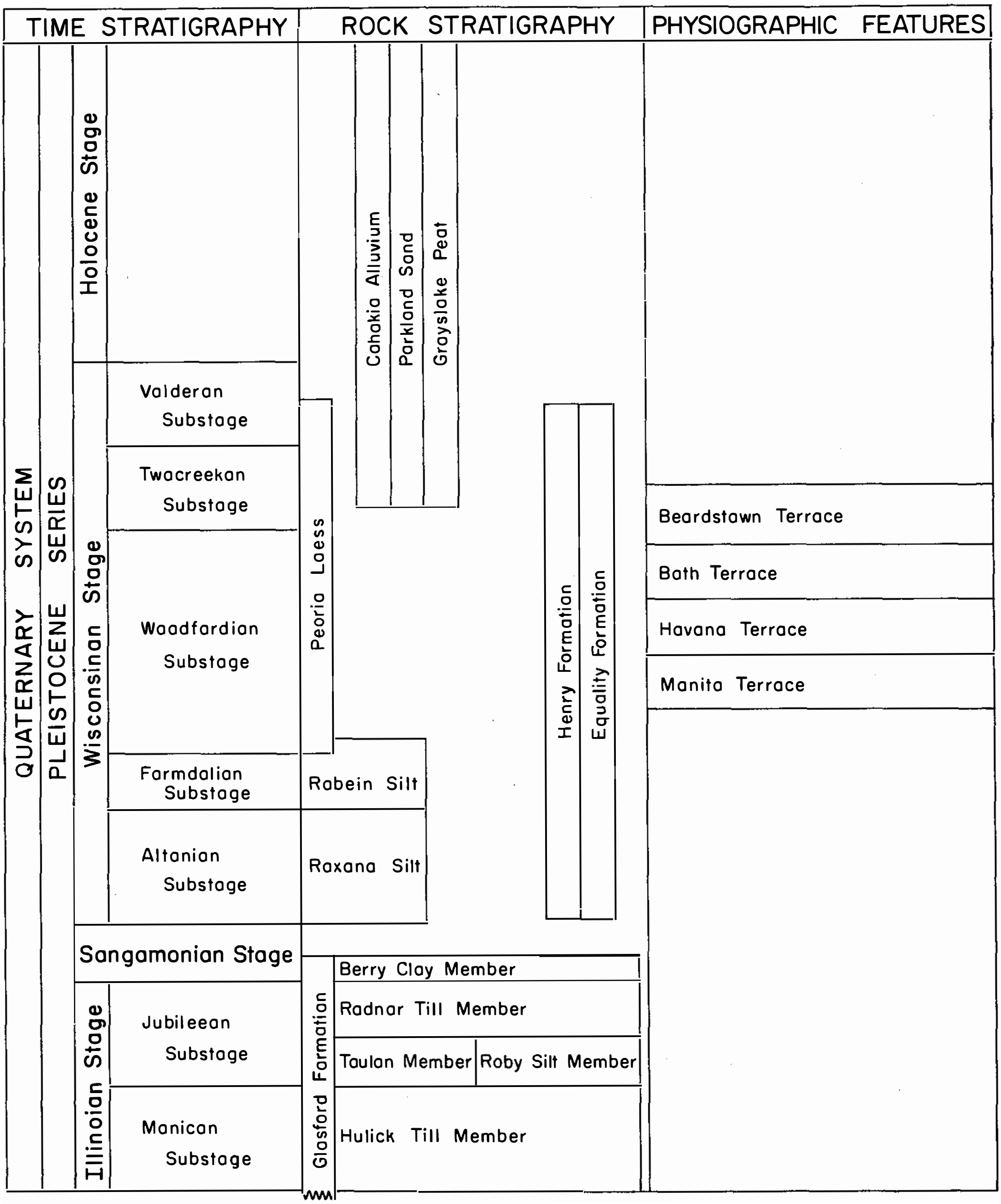

Fig. 3 - Generalized stratigraphic column (nomenclature taken from Willman and Frye, 1970).

are the Hulick and Radnor Members of the Glasford Formation (fig. 3) and represent the last two advances of the Illinoian glaciers. Other members of the Glasford Formation have not been recognized in Mason County.

The Illinoian till is located in the southeast portion of the county (see pl. 1 and fig. 4) and has a rugged morainic topography, which offers a contrast to the monotony of the relatively flat terraces in the rest of the county.

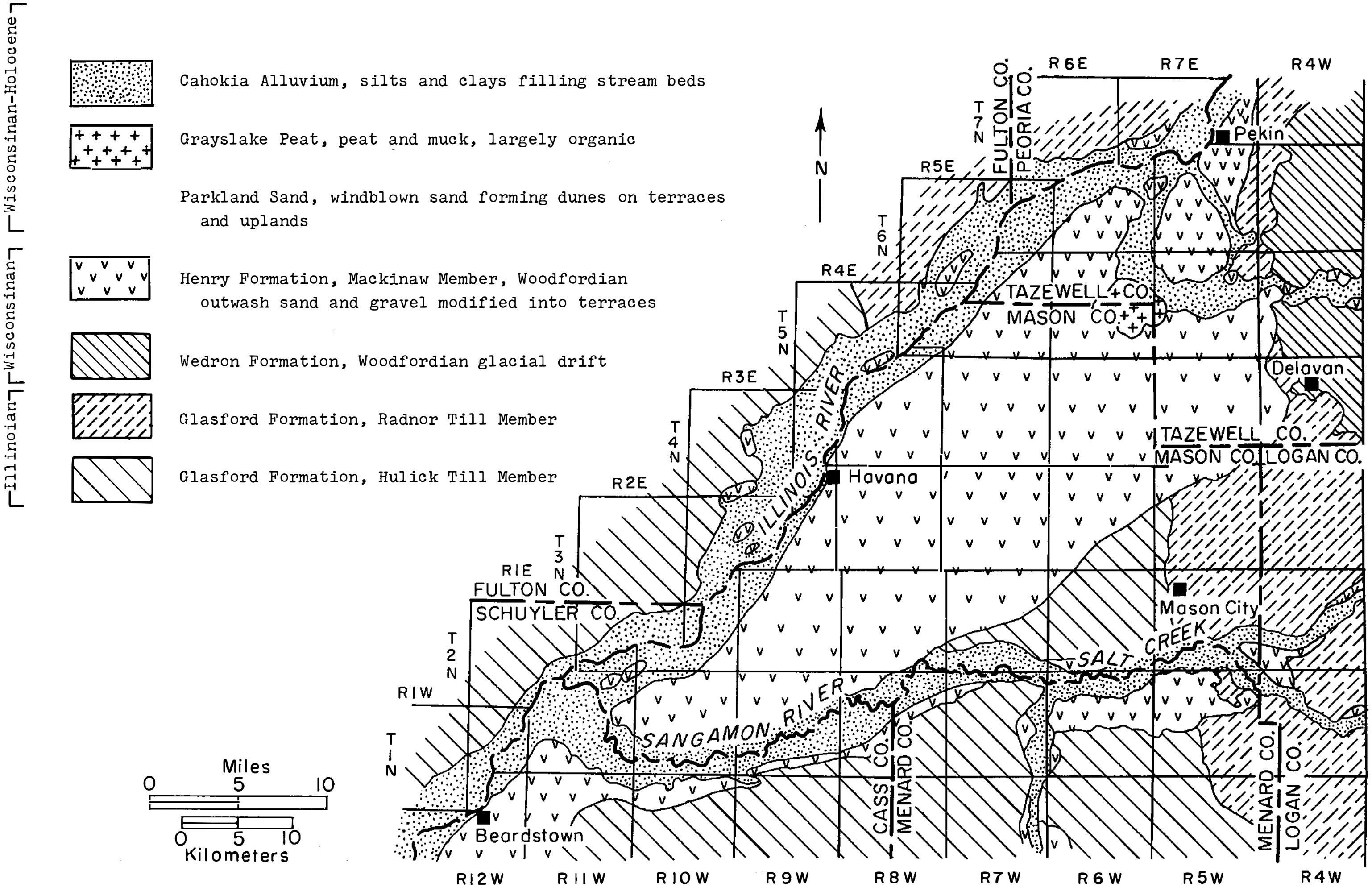

Fig. 4 - Generalized geologic map of Mason County and vicinity, adapted from Walker et al. (1965) and Willman and Frye (1970).

Outwash Sand and Gravel (Henry Formation)

The Henry Formation consists of sand and gravel outwash deposits of Wisconsinan age (fig. 3). In previous reports (Wanless, 1957; Walker et al., 1965), this outwash was called Bloomington; in this report it is classified as Woodfordian.

In Mason County, the formation is represented by valley trains in the Illinois River valley occuring as sand and gravel deposits derived from the melting Wisconsinan glaciers that stood to the north. As meltwater transported the glacial debris (a heterogenous mixture of all grain sizes) down the valley, the material was sorted. The degree of sorting was determined by the volume of meltwater, the velocity of meltwater, and the gradient of the valley. Generally, the coarsest material was deposited near the glacier and the fine material was carried downstream until it could no longer be transported by the water. The outwash in Mason County is, for the most part, coarse sand and fine gravel. Because the material was deposited by running water and because the amount of meltwater varied (corresponding to the rate of retreat of the glacier), the outwash was layered, or stratified, and it is common that layers of one grain size (e.g., medium sand) overlie layers of another grain size (e.g., coarse sand and fine gravel).

After deposition, the Henry Formation was modified during late Woodfordian time by the torrential waters of the Kankakee Flood (Wanless, 1957). Meltwater from glaciers in northeastern Illinois, southern Michigan, and northern Indiana flowed down the present Kankakee River into the Illinois River valley. The water cut two ill-defined terraces, the Manito (older and therefore higher) and the Havana, corresponding to two stages of the flood (Wanless, 1957, p. 148). Later in Woodfordian time, after a period of erosion, water from a proto-Lake Michigan (called Lake Chicago) also entered the Illinois River valley and deposited the sand and gravel deposits of the Bath-Beardstown Terraces. In this report, because the Beardstown Terrace is only 5 feet above the present floodplain, it is mapped as part of the floodplain (pl. 1).

Loess (Peoria Loess and Roxana Silt)

Loess is fine-grained, silt-size material removed from outwash deposits by wind and deposited on the uplands. In Mason County, the Peoria Loess and the underlying Roxana Silt blanket the uplands of Illinoian drift in the southeast part of the county (pl. 1) and are as much as 25 feet thick (Willman and Frye, 1970). In a railroad cut in the SW 1/4 SW 1/4 SW 1/4 sec. 23, T. 20 N., R. 5 W., approximately 30 feet of loess overlies Illinoian till. A power-auger test boring for this report penetrated 20 feet of loess in the NW 1/4 NE 1/4 SE 1/4 sec. 18, T. 20 N., R. 6 W., without encountering the underlying material.

Dune Sand (Parkland Sand)

During the Kankakee Flood, the upper part of the Woodfordian outwash was reworked and numerous sand bars were formed (Wanless, 1957). After the waters had subsided, these sand bars were exposed to the wind. The numerous sand dunes formed on the terraces are called the Parkland Sand. Some dunes migrated eastward onto the uplands. Most dunes are now stabilized by vegetation, and because wind concentrates finer particles, the sand dunes are a potential source for "blend sand," particularly in the southeastern part of the county. The specifications for "blend sand" are discussed in the section on uses.

Alluvium (Cahokia Alluvium)

Alluvium is the material deposited by streams and rivers in their floodplains since the retreat of the Wisconsinan glaciers. It is called the Cahokia Alluvium. For the most part, alluvium in Mason County consists of very fine sands, silts, and clays; locally, medium to coarse sands and gravels may be found in point bars along the river. This alluvium overlies the glacial outwash deposits of sand and fine gravel (Henry Formation) (fig. 2).

Peat (Grayslake Peat)

Peat is an accumulation of recognizable plant debris where it was preserved by deposition in lakes and swamps. Deposits of peat occur in sections 22, 23, 24, 25, and 26, T. 23 N., R. 6 W. The deposits occur in the floodplain of the Mackinaw River in low areas that probably are abandoned stream channels. A peat operation with a plant located at the center of the SW1/4 sec. 15, T. 23 N., R. 6 W., has been abandoned since about 1954.

DISTRIBUTION OF SAND AND GRAVEL

The areal distribution and the nature of the sand and gravel deposits in Mason County are discussed according to the location of deposits. The locations of the samples are listed in table 1, the sieve size-analyses of these samples are given in table 2, and the pebble counts are shown in table 3. In the appendixes are an index of some Mason County wells and the detailed logs of six of these wells.

Sand and Gravel in Terraces

Because terrace deposits make up approximately three-fourths of the surficial deposits in Mason County, they are a potentially important source of sand and gravel. As there are no outcrops or commerical pits in this terrace material, information was drawn from drillers' logs (see appendixes), power-auger borings, and observations in pits of adjacent counties. Wanless (1957) recognized four terrace levels in this area, the youngest of which (Beardstown) is mapped with alluvium in this report (pl. 1).

The oldest and highest terrace, Manito Terrace, consists for the most part of coarse sand and fine gravel that is locally overlain by fine to medium dune sand (pl. 1). The thickness of this terrace deposit generally exceeds 75 feet. Where fluvial sand bars were developed (such as Red Oak Ridge, sec. 33, T. 22 N., R. 6 W., and sec. 4, T. 21 N., R. 6 W.), the thickness of fine to medium sand may be as much as 40 feet. Although no samples of the coarse material were taken, the vertical variation in particle size may be seen in the logs for wells 11 and 33 (in appendix II) determined from well cuttings.

The Havana Terrace, an intermediate-level terrace, is characterized by coarse sand and some fine gravel overlain by various thicknesses of fine sand. The thicknesses of these deposits are comparable to those of the Manito Terrace deposits. Logs of two of the wells in the Havana Terrace, 27 and 39, are shown in appendix II.

The lowest, or youngest, mapped terrace, the Bath Terrace (pl. 1), consists also of coarse sand and some fine gravel with some silt intermixed. The log of well number 5 in the Bath Terrace appears in appendix II.

Most of Mason County is underlain by more than 100 feet (and probably 200 or more feet) of outwash deposits consisting of coarse sand and fine gravel. At the surface these terrace materials are overlain by sand ridges and aeolean sand dunes.

After the waters that deposited the outwash subsided, the exposed fluvial sand bars were reworked by wind and thus sand dunes were formed. Most of these dunes are concentrated in the western and central parts of the county and occur in association with deflation hollows or blowouts. On the east, the dunes are more scattered and the number of hollows diminishes. The dunes are composed of clean, medium to fine sand. Samples 10, 17-20, and 22-24 were recovered from dunes on the terraces by power-augering and were analyzed for possible use as "blend sand" (see Uses, p. 13, also tables 2 and 4). The thickness of the sand varies from place to place and may be as much as 20 feet or more, as at sample site 20, or as little as 13 feet, as at sample site 19.

Sand and Gravel in Uplands

The uplands in Mason County consist of till whose surface has an irregular morainic topography. The till itself consists of a mixture of clay, silt, sand, and gravel, and is at present useless as a sand and gravel resource. However, there are local surficial pockets in the till that are filled with outwash sand and gravel. Several excavation pits in this outwash were sampled (samples 3, 4, 5, and 11; see table 1 and pl. 1 for locations) and analyzed (see table 2 for results). The analyses show that these pockets are filled with, for the most part, coarse sand and some fine gravel. The distribution of these pockets is irregular and the thickness of the sand and gravel is probably no more than 25 feet. Records from wells drilled in these uplands indicate considerable thicknesses of coarse sand and fine gravel (see appendix I) overlain by till that varies in thickness from 35 feet to greater than 65 feet. The thickness of this overburden makes this resource economically inaccessible at present.

Various thicknesses of windblown sand and/or silt mantle the till. Samples 1, 2, 6, 12, and 16 are representative of the sand blown onto the upland. Analyses of this sand indicate that it is considerably finer than the dune sand to the west; this difference is due to more efficient particle-size sorting resulting from a longer distance of wind transport. Nelson Sand Company (SW 1/4 SE 1/4 NW 1/4 sec. 34, T. 21 N., R. 6 W.) reports that the thickness of the sand is generally 5 to 15 feet and seldom more than 20 feet. The distribution of the windblown sand, like that of the sand and gravel, is irregular and is based on topographic expression alone; it is difficult to determine whether a hill on the upland is made of sand or of loess. In general, test borings are necessary to determine the nature and extent of the deposits.

Sand and Gravel Underlying Stream Alluvium

The stream alluvium in Mason County consists primarily of silts and clays containing local pockets of clayey gravel. However, the alluvium overlies older outwash deposits of sand and gravel, and if the river is used for transportation, development of the sand and gravel will be facilitated where the thickness of overburden (alluvium) does not exceed 10 to 15 feet.

Information concerning the nature of the deposits underlying alluvium of the Sangamon River, Salt Creek, and the Illinois River is limited. Logs of wells 2 and 12 (appendix I) near the Sangamon River (pl. 1) indicate a considerable thickness of coarse sand containing some fine gravel; however, the overburden of clay and silt is also very thick, ranging from 85 feet at well number 2 to 20 feet at number 12. It appears from these data that the alluvial thickness decreases upstream. A power-auger hole drilled for this study at SE 1/4 NE 1/4 NE 1/4 sec. 36, T. 20 N., R. 5 W., in a low terrace between Sugar Creek and Salt Creek showed 8 feet of silty, clayey alluvium over an undetermined thickness of coarse sand and fine gravel (at least 4 feet). Sample 14 (table 1) came from a point bar on Sugar Creek near this terrace, and the stream cuts indicate that the overburden thickness ranges from 2 feet to greater than 10 feet (for analyses, see table 2).

The data are few from the alluvium of the Illinois River (and the Beardstown Terrace) in Mason County, but because of the size of the river and the constructional rather than destructional nature of the Beardstown Terrace (Wanless, 1957), the thickness of the alluvium is presumed to be great. Well data north of Mason County (Hunter, 1966) indicate thicknesses of alluvium and underlying outwash to be more than 50 feet. The thickness of the alluvium ranges from 5 to 10 feet in that area, and the outwash below the alluvium is reported to be sand and fine gravel.

There are numerous bars of sand and gravel along the Illinois River south of Peoria. Willman (1942) gave an analysis of a coarse sand and fine gravel sample taken from a bar on the floodplain in Fulton County across the river from Havana. Duck Island Sand and Gravel Company (NE 1/4 sec. 4, T. 5 N., R. 5 E.), Holle Building Service (SW 1/4 sec. 10, T. 3 N., R. 3 E.), and Otter Creek Sand and Gravel Company (NE 1/4 sec. 10, T. 3 N., R. 3 E.), all in Fulton County west of the Illinois River, are taking coarse sand to medium gravel from outwash materials underlying the floodplain deposits of the river.

PHYSICAL CHARACTERISTICS OF THE SAND AND GRAVEL

The sand and gravel in Mason County occurs as two distinct types of deposits. The first is the outwash sand and gravel which occurs in all of the county except for the southeast quarter (see figs. 2 and 4). This material is mostly coarse sand with some fine gravel. For example, only two of the sand and gravel samples retrieved from pits in the uplands and the terraces have gravel coarser than $1\frac{1}{2}$ inches in diameter (table 2). Pebble lithologies of the gravel are shown in table 3. The most common type of pebble is carbonate rock (limestone and dolomite), with the next most common being either chert or quartzitic rock.

The second type of deposit is the dune sand that covers the terraces and the uplands in Mason County. The dune sand is mostly medium- to fine-grained; in almost all samples collected from these dunes, more than 90 percent of the sample passed through the U. S. number 40 sieve. The sand collected on the terraces west of the uplands (numbers 22, 23, and 24 in particular; see pl. 1 and table 4) are coarser than those sands collected next to and on the uplands; this difference indicates that the sand becomes progressively finer southeast from the Illinois River.

TABLE 4 — SIEVE ANALYSES FOR "BLEND SAND" (FA-10)*
(Percent passing)

U. S. standard sieve number	Percent passing specifi- cations	Sample number														
		15a	15b	16	17a	17b	18a	18b	19	20a	20b	21	22	23	24a	24b
10	100	100	100	100	100	100	100	100	100	99.9	100	100	100	100	100	100
40	80-100	99.6	99.0	94.3	99.8	97.7	84.4	97.5	95.2	95.8	97.5	99.7	76.8	71.4	96.7	79.4
80	30-90	57.8	49.6	45.5	31.3	34.5	12.7	36.4	14.5	12.2	17.3	73.1	6.7	4.6	16.4	10.6
200	0-14	2.8	2.0	3.3	1.2	3.5	1.4	3.2	0.6	1.1	2.1	15.4	1.1	0.5	0.4	0.8
PAN																

*Specifications according to Standard Specifications for Road and Bridge Construction (State of Illinois, 1968).

USES

The sand that is being produced in Mason County is used in highway construction or road improvement. Nelson Sand Company, the only operator in Mason County at present, excavates the fine-grained windblown sand on the uplands for use as "blend sand," FA-10. "Blend sand" is mixed with "torpedo sand," FA-1, to make FA-3, which is used in producing the bituminous mixture "asphalt." The requirements outlined by the Division of Highways (State of Illinois, 1968) for "blend sand" are:

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

Samples meeting these requirements are 1, 2, 6, 7, 10, 12, 13, 15a, 15b, 16, 17a, 17b, and 18b (see tables 2 and 4 for specifics). Most of these samples came from the terraces adjacent to the uplands and on the uplands, where the sand is finer (see pl. 1 and fig. 2).

The requirements for "torpedo sand," FA-1, which is also used in the production of concrete, are:

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

Samples 3, 4, 5, 8, 11, and 14 (table 2), representing the coarse sand and fine gravel in the terraces and uplands, can be used in the production of both "torpedo sand" and coarse aggregate for portland cement mixes. The sand-size fractions of samples 3, 4, 5, 8, and 14 meet the requirements for "torpedo sand," and the remaining gravel could be used for a number of coarse-aggregate specifications.

In summary, fine-grained sand that meets "blend sand" (FA-10) specifications occurs as windblown sand dunes adjacent to and on the uplands in Mason County. Medium to coarse sand makes up the sand dunes closest to the river. "Torpedo sand" may be obtained from the coarse aggregate in the outwash deposits, principally in the terraces but also below the floodplain alluvium of the Illinois and Sangamon Rivers.

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APPENDIX I - INDEX OF SELECTED MASON COUNTY WATER WELLS

Well no.	Location						Description of material (from top to bottom)	Thickness in feet	
	¼	¼	¼	Sec.	T.	R.		Sand & gravel	Overburden (Silt & clay)
1	NE	SW	NE	8	19N	9W	Fine sand; coarse sand	79+	7
2	Center			14	19N	9W	Gray sand; coarse gray sand; finer gray sand	35+	85
3	SW	NW	SE	17	19N	9W	Fine brown sand; fine sharp sand; coarse sand and gravel	44+	0
4	NE	NW	SW	1	19N	10W	Yellow sand; fine sand; sand and gravel	90+	2
5	SE	SE	NW	9	19N	10W	Coarse sand; coarse sand and silt; coarse sand and fine gravel; fine gravel	104+	5
6	NW	SW	SW	13	19N	10W	Sand; coarse sand; medium sand; gravel	79+	5
7	NE	SW	SW	13	19N	11W	Coarse sand and fine gravel	83+	10
8	SE	SE	SE	10	20N	5W	Coarse sand and fine gravel	57	65
9	NE	NW	NE	22	20N	6W	Coarse sand and fine gravel	19.5+	34.5
10	SE	NE	NW	19	20N	7W	Medium to very coarse sand; fine gravel	100+	40
11	NW	NW	NW	21	20N	7W	Coarse sand and fine gravel	90+	70
12	NW	SW	SW	34	20N	7W	Fine gravel and some sand; medium to coarse sand	98	20
13	NW	SW	SE	1	20N	8W	Fine sand; medium to coarse sand and fine gravel	111+	2
14	SW	SW	SE	3	20N	8W	Fine sand; coarse sand and fine gravel	113+	2
15	SW	NE	NE	14	20N	8W	Fine sand; medium sand; coarse sand and fine gravel	104+	2
16	SE	SW	NE	34	20N	8W	Fine sand; coarse sand and fine gravel	101+	0
17	SW	SE	SE	12	20N	9W	Medium to coarse sand with gravel	118	15
18	SW	SE	SW	17	20N	9W	Fine sand interbedded with coarse sand and fine gravel	98+	2
19	NE	NW	NE	24	20N	9W	Fine sand increasing in coarseness and gravel content with depth	118	10
20	SW	NE	NW	28	20N	9W	Fine sand and some medium sand	96+	14
21	NE	NE	NE	19	21N	5W	Coarse sand and fine gravel interbedded with fine sand	131	50
22	SW	SE	NW	4	21N	6W	68' fine sand; coarse sand	98+	4
23	NW	SE	SW	4	21N	7W	35' fine sand; coarse sand and fine gravel	77+	3

APPENDIX I - Continued

Well no.	Location						Description of material (from top to bottom)	Thickness in feet	
	¼	¼	¼	Sec.	T.	R.		Sand & gravel	Overburden (Silt & clay)
24	SW	SE	SW	7	21N	7W	25' fine sand; sand and gravel	45^{+}	2
25	SE	SE	SE	15	21N	7W	66' fine sand; medium sand and gravel	103^{+}	5
26	NW	NE	SE	23	21N	7W	18' medium sand; interbedded clay and sand	41.5^{+}	7
27	SE	NW	NW	5	21N	8W	5' fine sand; medium to coarse sand and fine gravel	78^{+}	5
28	NW	NW	SE	7	21N	8W	Fine sand; medium to coarse sand and fine to medium gravel	96.5	2.5
29	NW	NW	NW	25	21N	8W	Fine sand; medium to coarse sand and fine gravel	103	2
30	SE	NW	SE	35	21N	8W	Fine sand; medium sand interbedded with coarse sand and fine gravel	115	5
31	SE	NW	NE	1	21N	9W	50' medium to coarse sand with gravel; sand	66^{+}	0
32	SE	SE	SE	33	22N	5W	Fine to medium sand	49^{+}	7
33	SW	NE	NW	2	22N	6W	Fine sand; coarse sand and fine gravel	92^{+}	3
34	SE	NW	NW	8	20N	5W	Sand; sand and gravel	164^{+}	36
35	NW	SE	SE	33	22N	6W	Fine sand	101^{+}	1
36	SE	NE	SE	11	22N	7W	8' sand; blue clay and coarse sand and fine gravel	95^{+}	0
37	SE	NE	SW	17	22N	7W	7' fine sand; medium sand to fine gravel	95^{+}	3
38	SW	NW	NW	25	22N	7W	30' fine sand; medium sand to fine gravel	93^{+}	2
39	SE	NW	NW	33	22N	7W	No record for 15' (probably fine sand); medium to coarse sand and fine gravel	154^{+}	0
40	SE	SE	NW	13	22N	8W	Fine to coarse sand; fine gravel inter-layered with sand	94^{+}	3
41	NE	SW	NE	25	22N	8W	Fine to medium sand and fine gravel	41.5^{+}	14
42	NW	NE	SE	33	22N	8W	32' fine sand; sandy clay (5') and coarse sand and fine gravel	85^{+}	0
43	SE	NW	SE	21	23N	6W	Coarse sand and medium gravel; medium sand to fine gravel	96^{+}	4

APPENDIX II — LOGS OF SELECTED MASON COUNTY WELLS

	Thickness (ft)	Depth to bottom (ft)
Well 5		
Soil	5	5
Sand, medium to coarse, clean	70+	75+
Gravel, fine, especially at 40-45' and 55-60'		
Well 11		
Sand, fine, red-brown, and silt	20	20
Silt, gray-brown, clayey	5	25
Sand, fine, clean	20	45
Sand, medium to coarse	25	70
Sand, coarse, and fine gravel	10+	80+
Well 27		
Soil	5	5
Sand, medium to fine, brown, non-calcareous	5	10
Sand, coarse to very coarse, and fine gravel	10	20
Sand, medium to coarse, and some fine gravel	5	25
Sand, medium to very coarse, and fine gravel	15	40
Sand, medium to coarse, and fine gravel	20	60
Sand, medium to fine, and fine gravel, brown, non-calcareous, silty	5	65
Sand, medium to coarse, and fine to medium gravel	15+	80+
Well 33		
Soil	5	5
Sand, medium to fine, clean, non-calcareous	5	10
Sand, medium to very coarse, and fine gravel	15	25
Sand, very coarse, and fine gravel	10	35
Gravel, fine, and some coarse sand	5	40
Sand, coarse to very coarse, and fine gravel	14	54
Sand, medium	17	71
Sand, coarse, and fine gravel	4	75
Sand, medium to coarse	5	80
Gravel, fine to medium, and some very coarse sand	5+	85+
Well 37		
Soil	3	3
Sand, brown, fine to medium, non-calcareous	2	5
Sand, fine to medium, clean	5	10
Sand, medium to coarse, and fine gravel	5	15
Sand, medium to coarse, and fine gravel	5	20
Sand, medium to very coarse	5	25
Sand, medium to coarse, and fine gravel	20	45

APPENDIX II — Continued

	Thickness (ft)	Depth to bottom (ft)
Well 37, continued		
Sand, medium to very coarse, and fine gravel	10	55
Sand, medium to very coarse	15	70
Sand, medium to very coarse, and fine to medium gravel	5+	75+
Well 39		
No record 0–15		
Sand, medium to coarse, dirty, calcareous	5	20
Sand, medium, clean, calcareous	5	25
Sand, medium to coarse, clean, and some fine gravel, calcareous	25	50
Sand, medium to coarse, clean, and some fine gravel	25+	75+

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