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DEPARTMENT OF REGISTRATION AND EDUCATION

SAND AND GRAVEL RESOURCES ALONG THE ROCK RIVER IN ILLINOIS

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ABSTRACT

The sand and gravel deposits of the Rock River Valley are largely the direct or indirect result of glacial processes. These deposits consist of ice-contact stratified drift, valley trains, sand dunes, and postglacial alluvium.

Valley train deposits, expressed as terraces above the present river floodplain, are the most important sources of sand and gravel in the Rock River Valley. Ice-contact deposits offer good possibilities for production of sand and gravel, but because of their extreme textural variability, they must be thoroughly tested before development. Sand dunes afford a good source of medium- to fine-grained sand but are not extensively developed. Postglacial alluvium does not constitute a major source of sand and gravel but has been worked in some places.

INTRODUCTION

Purpose of Report

This report is a continuation of the Illinois State Geological Survey's study of the sand and gravel resources of the state. Figure 1 shows the area covered by this report, as well as those areas covered by previous reports.

Rapid growth of metropolitan areas and continued expansion and improvement of the Illinois highway network require increasing quantities of sand and gravel for construction. Throughout most of its length in Illinois, the Rock River Valley is well endowed with such material, although the quantity and quality vary greatly. In addition to providing information useful for the commercial development of sand and gravel resources, this report may also be of value to those responsible for local and regional planning. Not only is the Rock River Valley well suited for commercial and industrial development, but it is also the site of many areas of unique

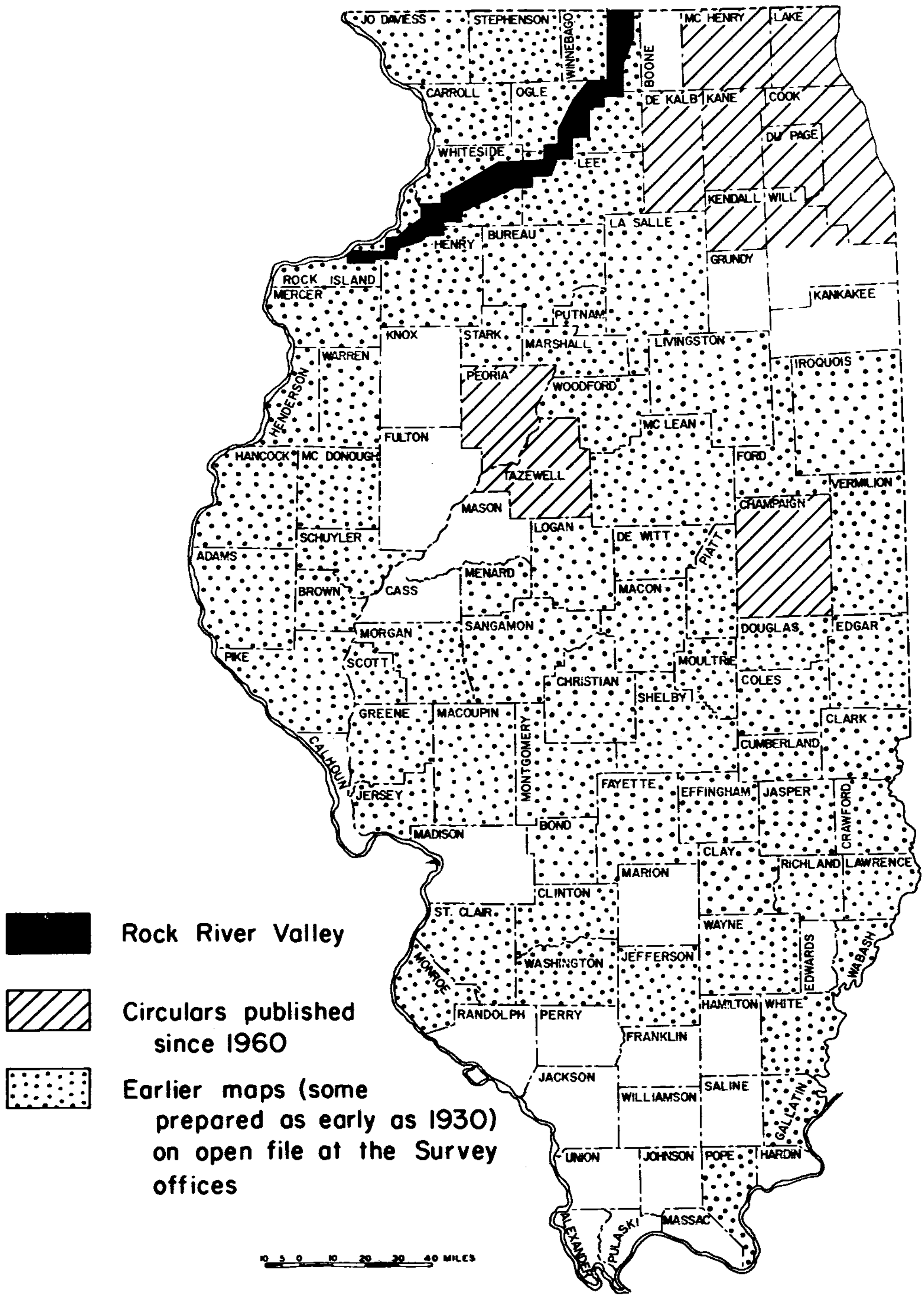

Figure 1 - Index map showing the Rock River Valley and other areas where sand and gravel resources have been mapped.

scenic and historic importance. Decisions concerning the use of land along the Rock River should be based on an adequate understanding of the earth materials that compose the valley.

Previous Investigations

The earliest geological investigations in the area of the Rock River were reported by Worthen (1873). The first detailed description of the glacial deposits along the Rock River was included in "The Illinois Glacial Lobe" by Frank Leverett (1899). The glacial deposits along the northern part of the Rock River in Illinois were also described by Alden (1918). Salisbury and Barrows (1918) have described the geology and geography of the former Camp Grant area south of Rockford. Detailed reports on the geology and mineral resources of the Kings Quadrangle (Bretz, 1923), the Dixon Quadrangle (Knappen, 1926), and the Milan Quadrangle (Savage and Udden, 1921) have been published by the Illinois State Geological Survey. A similar report on the Oregon Quadrangle by J. S. Templeton (c. 1950) is on open file at the offices of the Geological Survey. The origin of the present course of the Rock River has been discussed by Rolfe (1929), Horberg (1950), Templeton and Willman (1952), and Shaffer (1954).

Information regarding sand and gravel along the Rock River is also contained in ground-water reports on Winnebago County (Hackett, 1960), Lee and Whiteside Counties (Foster, 1956), and western Illinois (Bergstrom, 1956).

Acknowledgements

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GEOLOGIC HISTORY OF THE ROCK RIVER VALLEY

The Rock River has had a very complicated and eventful history that has determined not only the present course of the river, but also the distribution and character of the sand and gravel deposits within the valley and the location of bedrock outcrops on the valley walls and floor. An understanding of the main events in the history of the valley, therefore, is necessary for an evaluation of its mineral resources.

Preglaciation History

The limestones, sandstones, and shales that now constitute the consolidated bedrock of northern Illinois and surrounding areas were deposited in Paleozoic seas. After the withdrawal of these seas, the upper Mississippi Valley region, including the area of the present Rock River, was subjected to a long interval of stream erosion. During this time, the sedimentary rocks were deeply eroded, and although little is known of the details of this, as much as several hundred feet of sedimentary strata were removed. Erosion continued with only minor interruptions until the area was covered by glaciers during the Pleistocene Epoch (Ice Age), a recent geologic event. Glaciers of Nebraskan age, advancing from the northwest, may have covered the extreme lower part of the Rock Valley. During Kansan glaciation, ice from the west covered the lower valley. The Illinoian glaciers, advancing from the east, probably covered all of the valley. Deposits of these earlier glaciers have been eroded from most of the area. The Wisconsinan glaciers advanced from the east and were the source of nearly all of the glacial deposits now present in and near the Rock Valley. Table 1 shows the sequence of deposits that records the Wisconsinan history.

Immediately preceding the advance of the Wisconsinan glaciers into this area the landscape consisted of a well developed network of stream-carved valleys and intervening ridges with local relief of approximately 200 feet. Along the Rock River, this landscape now lies buried beneath glacial deposits that range up to 300 feet thick. The character of the ancient landscape can be reconstructed by a study of the records of wells drilled through the glacial deposits to the eroded bedrock surface below (Horberg, 1950, pl. 1; Hackett, 1960, pl. 1), by examining the present topography where the glacial deposits are thin, and by comparison with nearby areas in northwestern Illinois and southwestern Wisconsin where glacial deposits are absent.

The courses of the Rock and Mississippi Rivers and their tributaries prior to the advance of glacial ice into this area are shown in figure 2. Although some of the stream courses shown on this map may be realignments caused by early glacial advances, the ancient bedrock surface was largely developed before glaciation. It is important, however, to note the following: (1) the upper Ancient Rock River continues as a buried valley south and a little east of Rockford, whereas the present valley swings to the southwest, south of Rockford; (2) the Ancient Mississippi River flowed southeastward from the northern end of Rock Island County, joining the present Illinois Valley in southeastern Bureau County; and (3) the present Rock River follows its preglaciation valley to a point just south of Rockford where it veers to the southwest and takes its course across several southeastward- and southward-flowing tributaries, finally crossing the valley of the Ancient Mississippi River in southwestern Whiteside County. From there it continues southwestward, occupying the valley of two formerly east-flowing tributaries before joining the present Mississippi at Rock Island. It is obvious that the Rock River has been significantly displaced by glacial ice. Inasmuch as the sand and gravel deposits in the valley are also directly related to glacial ice, it is appropriate that the glacial history of the valley be reviewed.

Glacial and Postglacial History

Although the deep bedrock valley of the Rock River was overrun by glacial ice that advanced from the east and southeast on several occasions, the present valley was established during the latest glacial advance, the Wisconsinan. After retreating from its early advance across the region, Wisconsinan ice blocked the bedrock valley south of Rockford, thus diverting the river to its present position (fig. 2). Lakes formed in tributary valleys as a result of the glacial dams, but little direct evidence of their former existence remains except for stratified sand, silt, and clay deposits in places along the valley walls below Erie, Illinois. These sediments were deposited in "Glacial Lake Milan" (Shaffer, 1954), which was formed when the ice blocked the Ancient Mississippi Valley. The lakes in the tributary valleys overflowed and the waters joined those of the adjacent lake on the southwest, the downslope side (fig. 2). In turn, these waters discharged into Lake Mi-

TABLE 1 - SURFICIAL MATERIALS OF THE ROCK RIVER VALLEY

Age		Name	Description	Current use	Occurrence	Origin
Recent		Alluvium	Clay, silt, sand, pebbly sand	Limited use as a source of sand and gravel	Valley bottoms	Stream deposition
Pleistocene	Wisconsinan	Sand dunes	Medium- to fine-grained sand; generally leached of carbonates to a depth greater than 10 feet	Molding sand, construction	River terraces and adjoining uplands	Wind deposits
Pleistocene	Wisconsinan	Loess	Silt, tan colored, calcareous	No commercial or industrial use	Uplands	Wind deposits
Pleistocene	Wisconsinan	Lake deposits	Silt, fine-grained sand, tan, calcareous	No commercial or industrial use	Along valley walls	Deposition in ice-dammed lakes
Pleistocene	Wisconsinan	Valley train deposits	Sand and gravel; mostly gravel upstream from Rockford; mostly sand downstream from Sterling	Road material, aggregate	Terraces along base of valley walls	Glacial outwash
Pleistocene	Wisconsinan	Ice-contact deposits	Stratified silt, sand, and gravel, often interbedded with glacial till	Road material, aggregate	Along valley walls in vicinity of Oregon and upstream from Byron	Deposition by meltwater streams against glacial ice
Pleistocene	Wisconsinan	Glacial till	Bouldery clay	No current commerical or industrial use	Uplands	Glacial deposition

lan, which established its outlet at the lowest point on its enclosing rim, at Fairport, Iowa. Through this outlet, which became the Andalusia Gorge, the waters of the Mississippi and Rock Valleys reached what had been the lower portion of the Cedar River of eastern Iowa, at Muscatine, Iowa. The spillways were deeply eroded, and, at the same time, the ancient valleys were sufficiently filled with glacial debris so that when the glacier retreated the streams did not revert to their previous courses. Thus, the present course of the Rock River below Rockford and the course of the Mississippi River between Clinton, Iowa, and Muscatine, Iowa, were established.

After the outlet channels were deeply eroded and the lakes drained, large quantities of glacial meltwater, heavily laden with sand and gravel, were discharged through the valley. This outwash accumulated in the valley as deposits of sand and gravel. Such deposits are called "valley trains." Since the disappearance of the glaciers, the river has eroded the valley trains, and what remains now occurs as terraces standing as much as 60 feet above present river level. Sand dunes, formed by wind, have developed on these terraces in a number of places.

Relation of Geologic History to Occurrences of Sand and Gravel

The history of the Rock River Valley, in terms of its sand and gravel resources, can be summarized as follows: (1) the thickest and most extensive de-

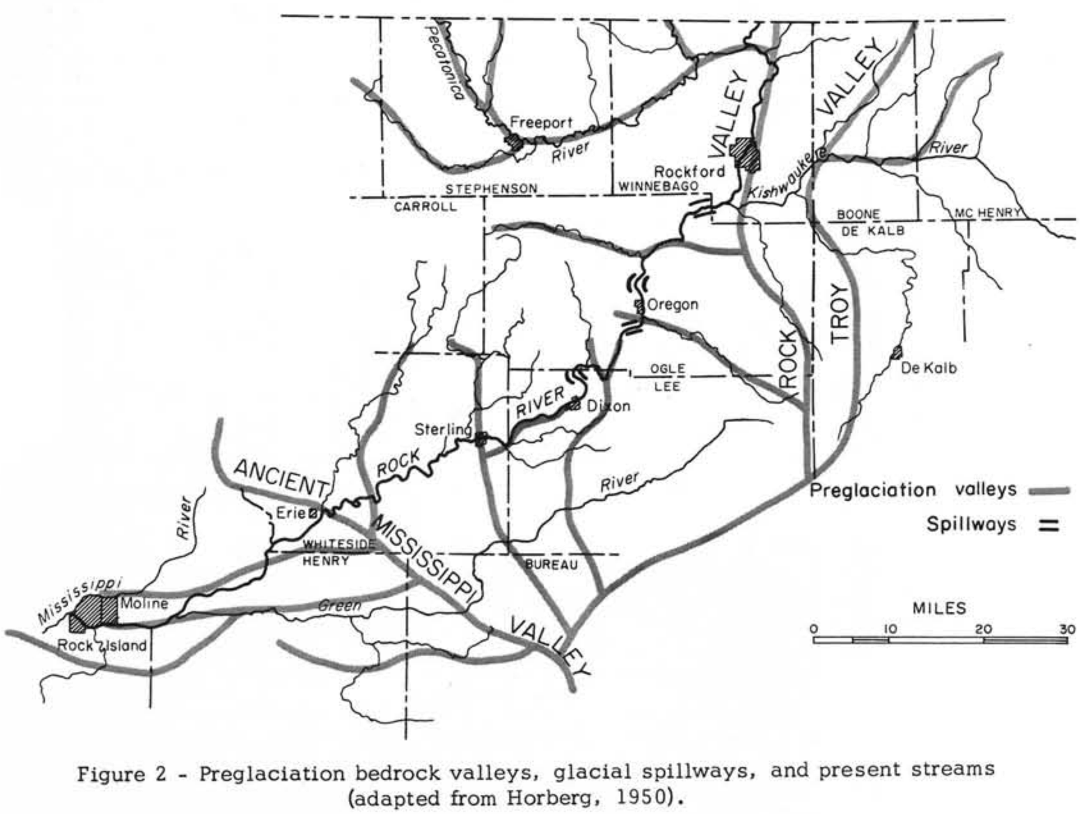

Figure 2 - Preglaciation bedrock valleys, glacial spillways, and present streams (adapted from Horberg, 1950).

posits of sand and gravel occur where the present valley coincides with buried bedrock valleys, most notably, upstream from Rockford; (2) because the primary source of sand and gravel outwash lay upstream in Wisconsin, there is, in general, a decrease in particle size of these materials in a downstream direction, the coarsest occurring between South Beloit and Rockford, the finest downstream from Sterling; and (3) the Mississippi River deposited sand and gravel along its ancient course through the Meredosia Channel at Erie and at the mouth of the Rock River.

TYPES OF DEPOSITS

Bedrock

The areas shown on plate 1 (map pattern 14; in pocket) as bedrock consist chiefly of dolomite and limestone, with an area of sandstone in the vicinity of Oregon and shales near Rock Island.

Most of the dolomite and limestone extending from the northern edge of the map downstream to Sterling-Rock Falls belongs to the Galena and Platteville Groups of middle Ordovician age. Small exposures of dolomite of the early Ordovician Prairie du Chien Group are found between Oregon and Dixon. Downstream from Sterling to Joslin, the few small bedrock outcrops are Port Byron Dolomite of Silurian age. Near the mouth of the Rock River, Cedar Valley and Wapsipinicon Limestones of Devonian age are exposed on Vandruff Island and along Mill Creek, a tributary draining into the Rock River from the south. Both Silurian Dolomite and Devonian Limestone are exposed in the Cleveland Quarry, 3 miles northeast of Green Rock (table 2).

The St. Peter Sandstone, underlying the Platteville Formation, is well exposed in the vicinity of Oregon and for several miles downstream near Dixon. A plant at Oregon produces glass sand, molding sand, and ground silica from the St. Peter.

Shales of Pennsylvanian age are exposed at a number of places along the valley walls in the Rock Island-Moline area, and isolated exposures occur upstream to within 3 miles of the northern line of Henry County.

Quarries that were active when visited during the summer of 1966 are listed in table 2.

Surficial Deposits

At most places along the Rock River, bedrock is covered by a variable thickness of unconsolidated surficial deposits. These constitute materials deposited by glacial ice, running water, and wind. Included are glacial till, ice-contact deposits, valley trains, lake deposits, loess, sand dunes, and alluvium (table 1).

Glacial Till

A glacier picks up material as it moves and, upon melting, deposits this debris as glacial till, an almost structureless mixture of clay, sand, pebbles, and boulders. Along the Rock River, glacial till occurs primarily on the uplands and, to a much smaller extent, on the valley walls (pl. 1, map pattern 13). It constitutes the bulk of the overburden for most valley-side quarry operations. Hence, it is important to note that its thickness increases toward the uplands and that as a

TABLE 2 - LOCATION OF ACTIVE QUARRIES ALONG THE ROCK RIVER

Name	Location				Rock		Use
	¼	Sec.	T.	R.	Name	Age	
Wilson and Shipler	NW	1	46 N.	1 E.	Platteville Limestone	Ordovician	Crushed rock
Rockford Blacktop	SE	33	45 N.	2 E.	Galena Dolomite	Ordovician	Crushed rock
Byron Material Co.	SE	30	25 N.	11 E.	Platteville Limestone	Ordovician	Crushed rock
Oregon Stone Quarries	Cen.	2	23 N.	10 E.	Platteville Limestone	Ordovician	Crushed rock; agricultural limestone
Manley Sand Division Martin-Marietta Corp.	Cen.	8	23 N.	10 E.	St. Peter Sandstone	Ordovician	Ground silica
Medusa Portland Cement Co.		27	22 N.	9 E.	Platteville Limestone	Ordovician	Cement
Wastone, Inc.	NE	12	20 N.	8 E.	Galena Dolomite	Ordovician	Crushed rock
Oregon Stone Quarries	SE	22	21 N.	8 E.	Galena Dolomite	Ordovician	Crushed rock
Midway Stone Co.	SW	16	18 N.	1 E.	Port Byron Dolomite	Silurian	Crushed rock; agricultural limestone
Cleveland Quarry	S½	31	18 N.	1 E.	Port Byron Dolomite, Wapsipinicon Limestone	Silurian Devonian	Crushed rock; agricultural limestone
Collinson Brothers	NW	25	17 N.	2 W.	Cedar Valley-Wapsipinicon Limestones	Devonian	Crushed rock; agricultural limestone
Allied Stone Co.	SE	14	17 N.	2 W.	Cedar Valley-Wapsipinicon Limestones	Devonian	Crushed rock

consequence, quarries expanded into the valley sides frequently encounter progressively greater thicknesses of overburden.

Ice-Contact Deposits

Large quantities of meltwater are commonly associated with glaciers. This water picks up debris released from the ice during melting and may transport it away from the ice front or, under certain circumstances, deposit it in contact with the ice. Such deposits are referred to as ice-contact deposits. Since the volume of meltwater varies with the rate of melting, its transporting power also fluctuates markedly. As a result, ice-contact deposits show a wide range of sizes, from silt to boulders, and, because of the proximity of glacial ice, the water-laid sediment is often interbedded with glacial till. Most of these deposits contain sand and gravel of good quality. However, their small size and the frequent presence of fine-grained materials precludes large-scale development in most areas.

Ice-contact deposits occur in the following areas: (1) along the east valley bluffs north of Rockford, (2) near the mouth of the Kishwaukee River and southwestward to Stillman Valley, (3) in the vicinity of Oregon, and (4) southwest and southeast of Grand Detour (pl. 1, map pattern 4).

The ice-contact deposits on the east bluffs north of Rockford range from fine-grained sand to coarse-grained gravel (tables 3 and 4, sample 4), have thicknesses in excess of 25 feet in places, and appear to be overlain by and grade into glacial till when followed into the bluff. The deposits near the mouth of the Kishwaukee River and in the vicinity of Stillman Valley are somewhat coarser than those north of Rockford and, in addition, they are without a till cover. In the pit in the E½ sec. 36, T. 43 N., R. 1 E., these deposits rest directly on Galena Dolomite. Elsewhere, they probably rest on glacial till. Limited exposures in the Oregon area suggest that the ice-contact deposits east of the river are coarser than those to the west. Coarse gravel with scattered boulders and associated glacial till occur in a small pit in the NE cor. sec. 12, T. 23 N., R. 10 E., whereas to the west, at the SE cor. sec. 6, T. 23 N., R. 10 E., up to 8 feet of coarse gravel overlies more than 12 feet of silt with interbedded very fine sand. The ice-contact deposits in the vicinity of Grand Detour contain much sand together with small amounts of medium- to coarse-grained gravel. These deposits rest directly on St. Peter Sandstone in the SW¼ sec. 30 and in the south-central portion of sec. 20, T. 22 N., R. 10 E.

Valley Train Deposits

Materials deposited within valleys by glacial meltwaters are referred to as valley trains. Such deposits usually consist of sand and gravel with minor quantities of silt and usually become progressively finer grained in the downstream direction. Along the Rock River, periods of valley train deposition alternated with periods of erosion in such a way that these deposits now occur as terraces above the level of the present river floodplain. Terraces occur at four, or possibly five, different levels along the river, and each is older than the next lower in the sequence. Information on the terraces is summarized in table 5.

Upper and Lower Terraces

Among the sand and gravel deposits along the Rock River, the upper and lower terraces are by far the most important (pl. 1, map patterns 6 and 7). They

TABLE 3 - SCREEN ANALYSES[1]
(Percent retained)

Sieve	Sample number 1	2	3	4	5	6	7	9	10	11	12	13	14	15	17
2½ inch	—	—	—	13.5	—	7.1	11.6	—	—	3.0	—	—	—	—	—
2 inch	2.0	1.5	—	2.2	—	—	—	—	—	1.4	—	—	2.1	—	—
1½ inch	8.9	7.4	2.6	8.3	—	0.8	12.8	3.1	—	7.6	—	—	0.4	—	—
1 inch	12.3	11.8	3.9	6.6	—	0.6	8.3	12.1	0.8	13.9	4.4	1.2	7.6	—	—
3/4 inch	11.8	11.2	6.0	6.9	—	2.2	8.1	13.4	1.5	11.9	8.8	1.9	9.0	—	—
1/2 inch	8.7	7.4	7.0	5.1	—	1.2	7.7	7.8	2.1	6.8	10.4	3.4	6.4	—	—
3/8 inch	8.3	7.8	7.3	4.9	—	1.7	8.1	9.3	2.8	8.8	10.9	5.4	5.7	—	—
3 mesh	5.6	5.6	7.1	3.9	—	1.7	6.6	6.7	2.0	6.5	8.0	5.1	5.1	—	—
4 mesh	4.6	4.9	7.3	3.9	—	3.2	6.4	5.6	2.0	5.8	7.0	5.5	5.2	—	0.1
6 mesh	3.4	5.4	4.2	2.0	—	3.9	5.3	3.6	4.3	2.7	6.0	12.7	4.4	—	0.5
8 mesh	3.2	4.1	3.5	1.7	—	3.9	8.1	2.0	4.0	2.9	4.7	8.2	4.2	—	0.7
10 mesh	3.5	2.9	2.6	1.2	0.1	3.4	6.3	1.1	3.9	2.6	3.2	8.0	2.4	—	1.2
14 mesh	4.1	2.0	3.7	1.2	0.1	3.6	4.1	1.1	3.7	2.3	2.5	6.0	2.2	—	1.9
20 mesh	4.2	1.9	5.2	1.2	0.3	4.7	2.5	1.7	3.8	2.4	2.3	5.9	2.9	—	3.4
28 mesh	6.4	5.6	12.5	2.1	0.8	12.1	2.0	3.5	8.6	5.0	4.8	10.3	3.2	0.1	12.7
35 mesh	5.8	10.1	13.5	3.5	3.3	20.0	0.9	15.4	17.1	8.4	7.6	12.5	17.6	1.2	27.7
48 mesh	3.9	7.6	8.8	8.3	10.7	18.2	0.5	10.2	30.3	5.6	9.9	10.1	16.8	9.6	31.5
65 mesh	1.6	2.1	2.5	7.8	13.2	7.0	0.1	2.4	10.7	1.0	5.1	3.0	3.7	25.2	9.8
100 mesh	1.1	0.6	1.1	5.2	13.8	2.8	0.1	0.8	2.1	0.7	2.5	0.7	0.9	26.5	6.6
150 mesh	0.3	0.1	0.4	2.9	15.2	0.6	0.1	0.2	0.2	0.2	0.7	0.1	0.2	13.8	2.5
200 mesh	0.1	Tr[2]	0.2	2.1	16.2	0.2	0.1	0.1	0.1	0.1	0.5	—	0.1	7.3	0.7
270 mesh	Tr[2]	—	0.1	1.3	9.4	0.1	Tr[2]	Tr[2]	—	0.1	0.2	—	—	3.6	0.2
Pan	0.1	—	0.6	4.2	16.8	0.4	0.3	0.1	—	0.1	0.5	0.1	0.1	2.7	0.4
Total	99.9	100.0	100.1	100.0	99.9	100.0	100.0	100.2	100.0	99.8	100.0	100.1	100.1	100.0	99.9
+1 inch	23.2	10.7	6.5	30.6	—	8.3	32.7	15.2	0.8	25.9	4.4	1.2	10.1	—	—
+4 inch	62.3	57.6	41.1	55.2	—	18.5	69.6	57.9	11.2	65.8	49.5	22.4	41.4	—	0.1
-4 inch	37.7	42.4	58.9	44.8	100.0	81.4	30.4	42.1	88.8	34.2	50.5	77.6	58.6	100.0	99.9

[1] Sieve tests by Carl Henderson, September 1966.

[2] Tr = Trace.

occur almost continuously along the river downstream to the vicinity of Erie and as remnants beyond that point. The deposits are coarsest and thickest between South Beloit and Rockford and are extensively exploited in this area. Here, both terraces consist of material ranging from medium-grained sand to coarse-grained, sandy, cobbly gravel that exceeds 25 feet in thickness everywhere except immediately adjacent to the valley walls (tables 3 and 4, samples 1-3, 5, 6, and 9). In the center of the valley, these deposits reach thicknesses in excess of 200 feet and represent several periods of gravel deposition (Hackett, 1960). In some places, these

TABLE 4 - LOCATION OF SAND AND GRAVEL SAMPLES

Sample number	Location						Thickness sampled (ft)	Source	Kind of deposit
	¼	¼	¼	Sec.	T.	R.			
1	NW	SW	SW	6	46 N.	2 E.	5	Gravel pit	Upper terrace
2	NE	NW	NE	29	46 N.	2 E.	5	Gravel pit	Lower terrace
3	SE	NW	SW	9	45 N.	2 E.	8	Gravel pit	Upper terrace
4	SW	SE	NW	28	45 N.	2 E.	10	Gravel pit	Ice-contact
5	SW	SE	NW	32	45 N.	2 E.	5	Gravel pit	Upper terrace
6	SW	SW	SW	35	44 N.	1 E.	Bank run	Gravel pit	Upper terrace
7	NW	SE	SE	4	43 N.	1 E.	10	Gravel pit	Rockford Terrace
8	NW	NW	NE	10	43 N.	1 E.	Bank run	Gravel pit	Lower terrace
9	NE	NE	SW	15	43 N.	1 E.	4	Gravel pit	Upper terrace
10	NW	SE	SE	31	25 N.	11 E.	5	Road cut	Upper terrace
11	NW	NW	NE	11	24 N.	10 E.	5	Gravel pit	Upper terrace
12	SW	SW	NW	21	20 N.	5 E.	4	Gravel pit	Upper terrace
13	SW	NW	SE	32	20 N.	5 E.	Bank run	Gravel pit	Alluvium
14	NE	SW	NW	36	18 N.	1 E.	Bank run	Gravel pit	Alluvium
15	SW	NW	SW	2	17 N.	1 E.	10	Sand pit	Sand dune
16	NW	SW	NE	21	17 N.	1 W.	Bank run	Gravel pit	Erie Terrace
17	NW	SW	NE	10	17 N.	2 W.	8	Gravel pit	Erie Terrace

materials are largely sand (W½ sec. 32, T. 45 N., R. 2 E.; SW¼ sec. 35, T. 43 N., R. 1 E.). In general, at any point along the river, the upper terrace is composed of coarser material than the lower terrace.

Downstream from the mouth of the Kishwaukee River, in the area where the Rock River flows in its newer valley formed by glacial diversion, the valley train deposits, confined to the narrow valley, are much less extensive than in the Rockford-South Beloit area. Numerous pits occur between Byron and Sterling, however, and the material exposed ranges from medium-grained sand to medium-grained sandy gravel (tables 3 and 4, samples 10 and 11).

Below Sterling, the valley becomes very broad, and the upper terrace merges with the very large outwash plain of the Green River Lowland. Fine- to medium-grained sandy gravel was observed in the low terrace in the NW¼ sec. 11, T. 20 N., R. 6 E., and in the upper terrace in the NW¼ sec. 21 and NE¼ sec. 22, T. 20 N., R. 5 E. (tables 3 and 4, sample 12). At Prophetstown, both the upper and lower terraces are well developed, but at this point they leave the Rock Valley and extend southwestward without interruption to the valley of the Green River. Downstream along the Rock River they occur only as small isolated remnants. The material in this area is mostly medium-grained sand and fine-grained sandy gravel.

Throughout the length of the river, these terraces commonly extend up the tributary valleys. In such locations, the materials range from medium-grained sand to clay (pl. 1, map pattern 10).

TABLE 5 - TERRACES ALONG THE ROCK RIVER

Age	Name	Height above river (ft)	Character of material	Occurrence
Youngest ↑	Erie Terrace	10–40	Sandy fine-grained gravel and pebbly sand; predominantly basalt and rhyolite in pebble fraction.	At Erie and at the west end of Rock Island (pl. 1, map pattern 5).
	Lower terrace	20–30	Medium- to coarse-grained sandy gravel changing downstream to pebbly sand. Pebbles 80 to 90% limestone and dolomite.	Almost continuously present from South Beloit to Erie; only scattered remnants below Erie (pl. 1, map pattern 6).
	Upper terrace	40–50	Medium- to coarse-grained sandy gravel changing downstream to pebbly sand. Pebbles 80 to 90% limestone and dolomite.	Almost continuously present from South Beloit to Erie; only scattered remnants below Erie (pl. 1, map pattern 7).
	Lake Milan Terrace	70–80	Laminated silt and fine-grained sand.	Scattered remnants downstream from about 3 miles north of Erie (pl. 1, map pattern 9).
Oldest	Rockford Terrace	60–70	Ranges from silt to very coarse-grained gravel. Pebbles and cobbles almost exclusively dolomite and limestone.	Restricted to west side of river in the area around Rockford; scattered locations downstream from Erie (pl. 1, map pattern 3).

Rockford Terrace

Remnants of an older terrace, called the Rockford Terrace in this report, occur on the west side of the valley at Rockford (pl. 1, map pattern 3). Up to 20 feet of very coarse gravel occurs in this terrace in the SW$\frac{1}{4}$ sec. 4 and the E$\frac{1}{2}$ sec. 9, T. 43 N., R. 1 E. (tables 3 and 4, sample 7). Overburden consists of 4 feet of silt and 4 feet of deeply weathered brownish red gravel. For convenience, three other terrace remnants are included with the Rockford Terrace: (1) an area of sand 3 miles south of Erie extending from sec. 30, T. 19 N., R. 4 E., to sec. 6 T. 18 N., R. 4 E.; (2) an area of sand south of Cleveland extending from sec. 36, T. 18 N., R. 1 E., to sec. 32, T. 18 N., R. 2 E.; and (3) an area of sand extending from sec. 19 to sec. 21, T. 18 N., R. 3 E.

Erie Terrace

The lowest valley train terrace along the Rock River is called the Erie Terrace in this report. It originated with events that occurred along the Mississippi River. The relation to these events is indicated by its elevation, which matches similar terraces along the Mississippi, and by its composition, mostly basalt and rhyolite, which reflects source rocks in the northern portion of the Mississippi drainage basin. Remnants of this terrace occur downstream from Erie and consist primarily of medium-grained pebbly sand (pl. 1, map pattern 5; tables 3 and 4, sample 17). In the past, medium-grained gravel has been recovered by dragline from these deposits in a pit in the SW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 21, T. 17 N., R. 1 W. The thickest of these deposits, in excess of 30 feet, lies near the mouth of the Rock River at the west end of Rock Island (sec. 10, T. 17 N., R. 2 W.).

Lake Milan Terrace

When glacial ice dammed the bedrock valleys, lakes were formed. Although small lakes undoubtedly existed in the southeast-trending valleys between Byron and Sterling when the Rock River diversion was in progress, the only extensive areas of lake sediments represent Glacial Lake Milan, formed by the damming of the Ancient Mississippi (Shaffer, 1954). These sediments are mostly laminated silt, and they occur along the valley walls at a number of places downstream from a point north of Erie (sec. 15, T. 20 N., R. 4 E.). A borrow pit in these sediments in the NE$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 25, T. 17 N., R. 2 W., shows 25 feet of fine- to medium-grained sand. Lake Milan sediments are shown on plate 1 only where they occur as distinct terraces (map pattern 9).

Loess and Sand Dunes

Much of the terrace and upland areas downstream from Sterling is covered by silt and sand deposited by the wind. Loess, a wind-deposited silt, constitutes a part of the overburden on stone and gravel deposits along the entire Rock River, but it reaches significant thicknesses only along the lower portion of the valley (pl. 1, map pattern 12). In most places, it simply mantles the surface on which it was deposited and has no distinctive topography of its own. Where it is exceptionally thick, in excess of 50 feet, it sometimes is deposited in ridges, called "paha," aligned in the direction of the depositing wind. The paha of the Rock River area occur on the bluffs north of the river between Como and Hillsdale (pl. 1).

Sand dunes occur on valley train terraces at several places along the middle and upper reaches of the Rock River in Illinois, but they are extensive only downstream from Dixon (pl. 1, map pattern 2). The sand is very well sorted and is medium to fine grained. The dunes are found almost exclusively southeast of the river, having been deposited by northwesterly winds carrying sand from the sandy valley train source lying to the northwest. The sand is leached to a depth of more than 15 feet and is used as a source of molding sand at Colona (cen. S$\frac{1}{2}$ sec. 2, T. 17 N., R. 1 E.) (tables 3 and 4, sample 15; Littlefield, M. S., 1925, p. 153-154, 166-167; Willman, H. B., 1939, p. 48-53; 1942, p. 70-71, 79).

Alluvium

The material deposited along the river and constituting its floodplain is called alluvium. The alluvium along the Rock River is the result of postglacial and present-day stream activity. In places, particularly where the present valley coincides with larger preglaciation valleys, the alluvium rests on older valley train sands and gravels. At Dixon, these older gravels are dredged from the river channel itself (NE$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 12, T. 21 N., R. 8 E.; NW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 6, T. 21 N., R. 9 E.).

Above Sterling, alluvium is restricted to narrow, discontinuous areas immediately adjacent to the river. Below Sterling, the floodplain is very broad, and several varieties of alluvium can be distinguished (pl. 1). Among these are sandy point-bar deposits formed on the insides of meander loops (map pattern 1), clayey and peaty muck deposits filling abandoned floodplain channels and backswamp areas (map pattern 8), and silty and sandy natural levee and braided stream deposits (map pattern 11). The latter are formed at times of flood and high sediment load. The alluvium rests on bedrock at shallow depths downstream from Erie. Although it does not constitute a major source of sand and gravel, the alluvium has been worked at a number of places, including the active pit at Prophetstown (SE$\frac{1}{4}$ sec. 32, T. 20 N., R. 5 E.; tables 3 and 4, sample 13). Between Sterling and Erie, alluvium lies on thick deposits of older valley train gravel. Recovery of mammoth and mastodon remains from the pit at Prophetstown suggests that older gravel lies beneath the alluvium at depths of 15 to 20 feet. Downstream from Erie, the alluvium is thin, generally less than 20 feet. A gravel pit 1 mile west of Cleveland (NW$\frac{1}{4}$ sec. 36, T. 18 N., R. 1 E.) is in fine-grained, sandy gravel (tables 3 and 4, sample 14). Several large abandoned pits have worked older gravel beneath alluvium near the mouth of the Rock River (secs. 15, 16, 22, and 27, T. 17 N., R. 2 W.). These older deposits are typical Mississippi River gravels, having abundant basalt and rhyolite pebbles and few limestone and dolomite pebbles.

Pebble Counts

Determination of the types of rocks found in the gravel of the Rock River Valley are summarized in table 6. Upstream from Erie, the gravel is predominantly dolomite (60 to 70 percent) and chert (10 to 20 percent), which is the most common bedrock within the drainage basin of the Rock River. Precambrian igneous and metamorphic rocks from the Canadian Shield constitute less than 15 percent of most samples. Soft sandstone, siltstone, and shale occur in minor amounts (table 6, samples 1-13). Downstream from Erie, basalt, rhyolite, and other igneous and metamorphic rocks from the Precambrian of the Lake Superior region make up almost 90 percent of the total. Less than 10 percent is dolomite and chert (table 6, samples 14 and 16). Lake Superior rock types are characteristic of Mississippi

TABLE 6 - PEBBLE COUNTS
(Percent by number of pebbles)

Sample number	1		2		3		4		6		7		8		9		10		11		12		13		14		16	
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	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	64	66	59	69	65	60	72	72	Insufficient data	55	70	70	61	No data	63	60	Insufficient data	61	69	64	61	58	Insufficient data	62	—	—	3	No data
Limestone	5	4	4	4	6	3	4	6		5	6	11	4		10	7		9	4	6	3	5		5	—	—	3	
Chert	17	20	14	14	19	22	8	6		26	7	12	23		15	21		24	13	14	18	11		19	6	5	4	
Sandstone, siltstone, shale	—	2	1	4	1	—	—	1		2	5	—	—		1	1		—	1	1	2	—		—	12	9	8	
Dark-colored igneous	6	5	10	3	2	2	5	6		2	8	1	5		3	2		2	5	6	8	8		3	36	41	31	
Granitic igneous	2	1	1	2	2	5	5	5		2	3	2	2		2	4		—	2	5	1	5		3	12	17	16	
Rhyolite	1	—	—	—	—	—	—	2		1	—	—	1		1	3		—	—	—	—	2		3	15	13	19	
Jasper	—	—	—	—	—	—	—	—		—	—	—	—		—	—		—	—	—	—	—		—	1	2	—	
Quartz	—	1	1	1	—	3	1	—		4	—	1	—		—	1		—	—	1	1	4		1	4	2	3	
Quartzite	1	—	4	—	1	2	4	—		2	—	—	4		—	—		1	1	1	2	2		4	4	3	5	
Gneiss	1	—	1	—	—	1	1	1		—	—	1	—		3	1		—	—	1	1	1		—	4	—	3	
Schist	1	—	1	—	1	—	—	—		—	—	—	—		1	—		—	1	—	1	—		—	—	—	1	
Graywacke	2	1	4	3	3	2	—	1		1	1	2	—		1	—		3	4	1	2	4		—	6	8	4	
Total	100	100	100	100	100	100	100	100		100	100	100	100		100	100		100	100	100	100	100		100	100	100	100	

River gravels, and they show that the segment of the Rock Valley below Erie was once occupied by the Mississippi River.

SAND AND GRAVEL INDUSTRY

Gravel and sand pits producing road material and concrete aggregate are widely distributed along the Rock River. Molding sand is also produced at a pit near Colona. Many of the gravel pits are operated intermittently. The sand and gravel pits along the Rock River are shown on plate 1, and pits that were active when visited during the summer of 1966 are listed in table 7.

TABLE 7 - LOCATION OF ACTIVE SAND AND GRAVEL PITS ALONG THE ROCK RIVER

Name	Location				Type of deposit
	¼	Sec.	T.	R.	
Wilson and Shipler	SW	6	46 N.	2 E.	Upper terrace
Lock-Joint Pipe, International Pipe and Ceramics Corp.	W½	8	46 N.	2 E.	Upper terrace
Durgom Concrete Pipe Co.	NW	17	46 N.	2 E.	Upper terrace
John L. Kelly Sand and Gravel	NE	29	46 N.	2 E.	Upper terrace
Larson Brothers	SW	9	45 N.	2 E.	Upper terrace
Rockford Blacktop	NW	32	45 N.	2 E.	Upper terrace
Sahlstrom Building Products	SW	35	44 N.	1 E.	Upper terrace
Rockford Sand and Gravel Co.	NE	10	43 N.	1 E.	Upper and lower terrace
Rockford Sand and Gravel Co.	NW	22	43 N.	1 E.	Upper terrace
Rock River Redi-Mix	NE	6	21 N.	9 E.	Alluvium and valley train
Fraza Materials Co.	NW	12	21 N.	8 E.	Alluvium and valley train
Nelson Sand and Gravel	SE	17	21 N.	8 E.	Upper terrace
Collinson Brothers	SE	32	20 N.	5 E.	Alluvium and valley train
Oberleander Sand Co.	SE	2	17 N.	1 E.	Sand dunes

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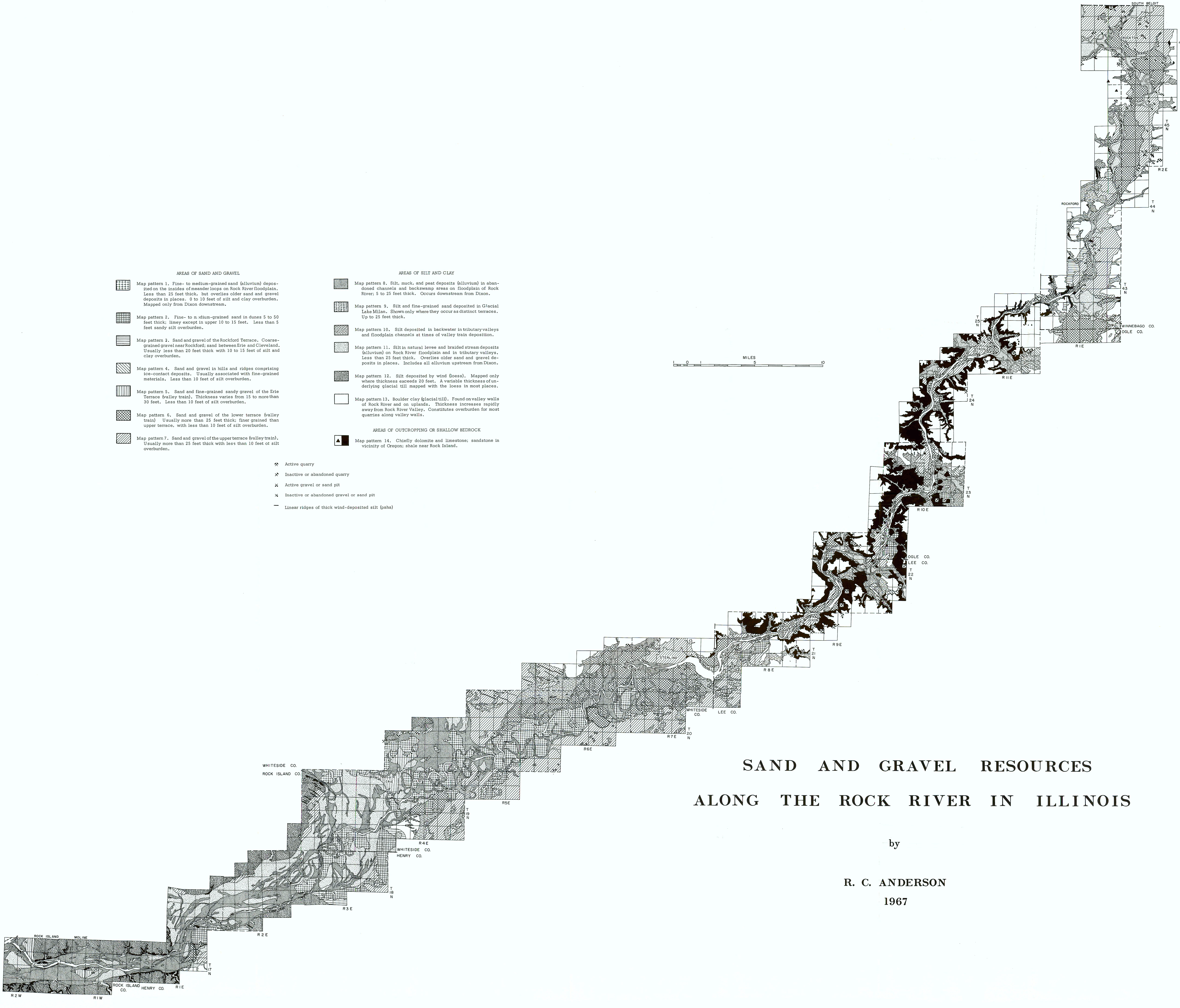

MILES

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AREAS OF SAND AND GRAVEL

Map pattern 1. Fine- to medium-grained sand (alluvium) deposited on the insides of meander loops on Rock River floodplain. Less than 25 feet thick, but overlies older sand and gravel deposits in places. 0 to 10 feet of silt and clay overburden. Mapped only from Dixon downstream.

Map pattern 2. Fine- to medium-grained sand in dunes 5 to 50 feet thick; limey except in upper 10 to 15 feet. Less than 5 feet sandy silt overburden.

Map pattern 3. Sand and gravel of the Rockford Terrace. Coarse-grained gravel near Rockford; sand between Erie and Cleveland. Usually less than 20 feet thick with 10 to 15 feet of silt and clay overburden.

Map pattern 4. Sand and gravel in hills and ridges comprising ice-contact deposits. Usually associated with fine-grained materials. Less than 10 feet of silt overburden.

Map pattern 5. Sand and fine-grained sandy gravel of the Erie Terrace (valley train). Thickness varies from 15 to more than 30 feet. Less than 10 feet of silt overburden.

Map pattern 6. Sand and gravel of the lower terrace (valley train) Usually more than 25 feet thick; finer grained than upper terrace, with less than 10 feet of silt overburden.

Map pattern 7. Sand and gravel of the upper terrace (valley train). Usually more than 25 feet thick with less than 10 feet of silt overburden.

AREAS OF SILT AND CLAY

Map pattern 8. Silt, muck, and peat deposits (alluvium) in abandoned channels and backswamp areas on floodplain of Rock River; 5 to 25 feet thick. Occurs downstream from Dixon.

Map pattern 9. Silt and fine-grained sand deposited in Glacial Lake Milan. Shown only where they occur as distinct terraces. Up to 25 feet thick.

Map pattern 10. Silt deposited in backwater in tributary valleys and floodplain channels at times of valley train deposition.

Map pattern 11. Silt in natural levee and braided stream deposits (alluvium) on Rock River floodplain and in tributary valleys. Less than 25 feet thick. Overlies older sand and gravel deposits in places. Includes all alluvium upstream from Dixon.

Map pattern 12. Silt deposited by wind (loess). Mapped only where thickness exceeds 20 feet. A variable thickness of underlying glacial till mapped with the loess in most places.

Map pattern 13. Boulder clay (glacial till). Found on valley walls of Rock River and on uplands. Thickness increases rapidly away from Rock River Valley. Constitutes overburden for most quarries along valley walls.

AREAS OF OUTCROPPING OR SHALLOW BEDROCK

Map pattern 14. Chiefly dolomite and limestone; sandstone in vicinity of Oregon; shale near Rock Island.

Active quarry

Inactive or abandoned quarry

Active gravel or sand pit

Inactive or abandoned gravel or sand pit

Linear ridges of thick wind-deposited silt (paha)

SAND AND GRAVEL RESOURCES ALONG THE ROCK RIVER IN ILLINOIS

by

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