Geology and Groundwater Resources of the Bedrock at Rockford*

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The bedrock formations of the Rockford area range in age from pre-Cambrian crystallines to the Galena dolomite of Mohawkian age. The stratigraphic sequence of the area is shown in Plate I.

Several wells in northern Illinois have penetrated the pre-Cambrian and have shown it to be red granite. The same material probably composes the pre-Cambrian of the Rockford area.

Cambrian System

The rocks of the Cambrian system are all of St. Croixan or upper Cambrian age. The Cambrian formations named in order from bottom to top are, the Dresbach formation consisting of the Mt. Simon, Eau Claire and Galesville members, the Franconia formation, and the Trempealeau dolomite.

Dresbach formation: Mt. Simon sandstone member. The Mt. Simon member consists, for the most part, of sandstone, probably arkosic at the base. The sand is usually poorly sorted, ranging from very fine to very coarse, locally becoming conglomeratic. There is a wide variation in color of the sandstone ranging through white, gray, buff, yellow, pink, red, and purple. In the upper part of the formation are erratic lenses of sandy, partly dolomitic, red and green shales. Locally there are lenses of pink, purple and yellow, granular conglomerate, generally appearing at a horizon 300 to 400 feet below the top of the member. The thickness of the member is estimated at 1,600 feet.

Eau Claire member: The base of the Eau Claire member is marked by a distinctive horizon of sooty-appearing sandstone, the individual grains being covered by a black incrustration of finely divided pyrite. It has been suggested that this finely divided pyrite is an indication of the presence of organisms, and the fact that fragments of trilobites and lingulas are found in this zone in some areas substantiates this belief. This zone is generally 10 to 20 feet thick. From the sooty zone upward for about 300 feet, the member consists of a rather monotonous succession of white to buff, fine to medium grained sandstones with erratic dolomitic zones and dolomite lenses. The upper hundred feet of the Eau Claire consists of sandy and silty, dolomitic, red and green shales interbedded with fine, dolomitic sandstones and sandy, argillaceous dolomite. The aggregate thickness of the member varies from 395 to 420 feet.

Galesville member: The Galesville sandstone member ranges in thickness from 95 to 120 feet within local limits. The formation is thickest in this area in a zone trending northeast-southwest through the central part of the city. Southeastward and northwestward the formation thins slightly. The sandstone is white to buff, fine to coarse sand with scattered dolomitic areas, which may become sandy dolomites in some localities, especially in the upper 20 feet of the member.

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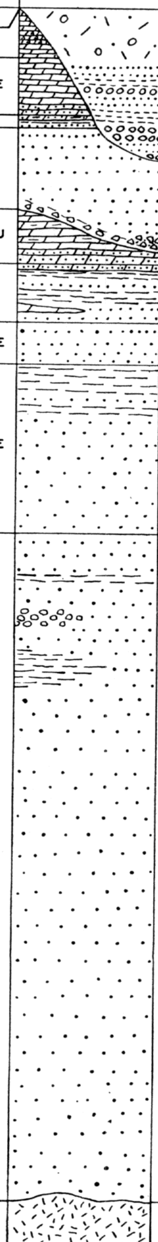
COLUMNAR SECTION OF FORMATIONS AT ROCKFORD SCALE: 1 IN. = 225 FT.



SYSTEM	SERIES	FORMATION	GRAPHIC SECTION	THICKNESS IN FEET	DESCRIPTION
PL				5 - 400	TILL; SILT; SAND; GRAVEL
ORDOVICIAN	MOHAWKIAN	GALENA		0 - 125+	DOLOMITE, BUFF, MEDIUM
		PLATTEVILLE		0 - 145	DOLOMITE, BUFF, VERY FINE, SANDY AT BASE
		GLENWOOD		0 - 30	DOLOMITE; SHALE; SANDSTONE
	CHAZYAN	ST. PETER		175 - 275	SANDSTONE, WHITE; CONGLOMERATE, CHERTY, AND SHALE, RED AT BASE
CAMBRIAN	ST. CROIXAN	TREMPEALEAU		40 - 120	DOLOMITE, PINK, FINE
		FRANCONIA		115 - 125	SHALE, GLAUCONITIC; SANDSTONE, GLAUCONITIC; DOLOMITE, SANDY
		DRESBACH: GALESVILLE		95 - 110	SANDSTONE, WHITE AND BUFF
		DRESBACH: EAU CLAIRE		395 - 415	SANDSTONE, WHITE; SHALE, RED, GREEN AT TOP; SANDSTONE, SOOTY, GRAY AT BASE
		DRESBACH: MT. SIMON		1600	SANDSTONE, WHITE, BROWN, RED; SHALE, SANDY, RED, GREEN AT TOP; SOME CONGLOMERATE
PRE€				?	RED GRANITE; OTHER CRYSTALLINES

PLATE I.

Franconia formation: The Franconia is rather consistently 125 feet in thickness. The formation is composed of sandstone which is fine grained, glauconitic, dolomitic, white, pink, and red. It contains interbedded sandy, glauconitic, red and green shales and siltstones. At the base of the formation is the Ironton sandstone member which is a coarse dolomitic, glauconitic, white to red sandstone, having been formed by sorting and redeposition of the Galesville sandstone by the encroaching Franconia sea. The upper 10 to 20 feet of the formation is a very sandy, pink, fine grained, compact dolomite very similar in appearance to the overlying Trempealeau formation. The upper contact of the Franconia is difficult to determine, for the Franconia seems to grade into the Trempealeau, but the boundary is generally placed where very sandy dolomite gives place to dolomite which is less sandy.

Trempealeau dolomite: The Trempealeau formation consists of argillaceous, partly sandy, partly glauconitic, pink and white finely crystalline dolomite. The formation varies widely in thickness, from 25 to 120 feet, due to the pre-St. Peter unconformity. The formation is thinnest in a belt about three-fourths to one mile wide, running northeast-southwest just east of Rock River. To either side of this belt the formation thickens rapidly to a maximum of 120 feet in the west central part of Rockford. This suggests a pre-St. Peter channel about 100 feet deep.

Ordovician System

Although the Jordan sandstone of Cambrian age and the overlying Oneota of the Prairie du Chien series were probably deposited over the area they were removed by a period of profound erosion which preceded the deposition of the St. Peter sandstone.

The Ordovician formations named in order from bottom to top are the St. Peter sandstone, the Glenwood formation, the Platteville dolomite, the Decorah formation, and the Galena dolomite.

Chazyan Series

St. Peter sandstone: The basal 30 to 50 feet of the St. Peter is a conglomerate composed of pink and white colitic chert and sand and red to brown clay. The chert and clay, and probably some of the sand, were derived from erosion of the pre-St. Peter formation in the area. Partings of red shale are frequently found in the sandstone in this zone. Succeeding this conglomerate is the typical white to pink, fine to coarse grained sandstone of the St. Peter.

The thickness of the St. Peter varies considerably in short distances from 180 to 300 feet. As might be expected, the formation is thickest in the same belt in which the Trempealeau is thinnest, that is, in a northeast-southwest belt extending from section 18, T. 44 N., R. 2 E., southwestward through sections 13, 24, 25, 35, and 36, T. 44 N., R. 1 E. Northwest of this belt there is a thinning of the St. Peter until the western part of Rockford is reached, where a single well record suggests that the formation is again thicker. A very minor part of the variation in thickness is to be attributed to pre-Pleistocene erosion which in places removed the overlying formations and cut into the St. Peter.

Mohawkian Series

Glenwood formation: The Mohawkian epoch opened in this area with the deposition of the dolomitic, white, fine and coarse sandstone, sandy, brown and green shale, and sandy, argillaceous, green, rather earthy dolomite of the Glenwood formation. The sandstone occurs in the basal 10 to 15 feet of the formation and probably represents the reworking of the St. Peter so that the coarse grains of the sandstone are well rounded and frosted. The angular fine grains may have come from a source other than the St. Peter, as there is a very decided break in grade size between the fine and coarse grains. The shale occurs interbedded with the dolomite, or underlying it, and varies in thickness from 0 to 10 feet. The dolomite is found in the upper 10 feet of the formation, ranging in thickness from 0 to 30 feet. The formation varies greatly in character laterally, consequently in some wells the formation is composed entirely of dolomite, while in others there is little or no dolomite. The composite thickness of the formation is consistently near 30 feet.

Galena-Platteville formation: The thickness of the Platteville formation varies from 0 to 145 feet due to the uneven bedrock surface in the area. The formation is entirely lacking along the Rock River channel and attains its maximum thickness to the east in the vicinity of Mauh-Nah-Tee-See Country Club. At the base of the Platteville a sandy, buff, gray and brown, finely crystalline dolomite occurs, ranging in thickness from 0 to 30 feet. This lower dolomite contrasts with the underlying Glenwood dolomite in not being argillaceous and having finely crystalline texture. Above this basal portion, the formation is composed of buff, brown and gray, finely crystalline dolomite.

The upper contact of the Platteville is drawn where the very finely crystalline, compact dolomite gives place to coarser vesicular dolomite. Although the Decorah is probably present in many wells in the vicinity of Rockford, it has not yet been distinguished in well cuttings.

The Galena formation is composed entirely of yellow to buff and brownish-gray, partly cherty, medium crystalline, vesicular dolomite. The thickness of the formation varies considerably, being absent over large parts of the area but attaining a thickness of over 100 feet in some portions.

Structure

The geologic structure at Rockford is very simple. Extending from section 18, T. 44 N., R. 2 E., southwestward through sections 13, 24, 25, and 35, T. 44 N., R. 1 E., there is a shallow basin about one mile wide and of a differential elevation not exceeding 80 feet. The basin is fairly symmetrical. It is bounded on the west by a slight dome and there is some indication of a similar doming to the east of the basin. Due to the lack of data, the northern and southern limits of the structure cannot be defined. The time of folding can be fixed no closer than of post-Galena pre-Pleistocene age.

Sources of Ground Water Supplies

Large volumes of water are obtainable from the St. Peter, Galesville, and Mt. Simon sandstones. The city wells of Rockford obtain their supplies from all three horizons, as do many of the industrial wells. Formerly the city supply was obtained from the St. Peter sandstone, but the St. Peter wells were abandoned in favor of the deeper wells. The yield of 10 to 12-inch wells into these three formations varies from 600 to 1,400 gallons per minute. Numerous private wells obtain water only from the St. Peter sandstone and a few from the Platteville dolomite.