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Illinois State Geological Survey

Urbana, Illinois

Mineral Resources Section

Report on Conferences Concerning the Geological Conditions Related to a Proposed New Water Supply at Fairbury, Illinois

August 24 and September 20, 1933

Approved:

M. M. Leighton, Chief

Signed:

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ABSTRACT

The City of Fairbury is considering the possibility of obtaining its municipal water supply from shallow wells in place of the deep wells now in use. A consideration of the geologic conditions in the vicinity of Fairbury reveals that a constant, more than adequate supply of water with low mineral content may be obtained from shallow wells located in the floodplain and terraces of Indian Creek, which flows past the southeast edge of the town. The evidence and interpretation warranting this assertion are presented in detail in the appended report.

Purpose. Two conferences have been held at Fairbury to discuss with the city officials and aldermen how the geologic conditions in that vicinity control possible shallow water supplies for the town. At the first conference, which was arranged at the suggestion of Mr. W. D. Gerber, Engineer of the State Water Survey, who had previously conferred with the city officials, Messrs. L. B. Decker, City Clerk, J. C. Kessler, Alva Carter, L. S. Henderson, and Emil Keller, Aldermen, were present and the aldermen accompanied me to verify in the field some of the detailed topographic and geologic relations along Indian Creek. The second conference was held at the request of Mr. J. J. Woltmann, Bloomington, Illinois, whom the city had retained as consulting engineer subsequent to the first conference. In addition to Mr. Woltmann and the city officials who had been present at the first conference, Messrs. George H. Franzen, Mayor, and R. A. McAllister, Alderman, were present at the second conference and all joined in a field inspection of possible locations for wells and possible sites for a pumping and treatment plant.

Geologic Situation. The City of Fairbury occupies most of the S. 1/2 sec. 3 and adjacent parts of secs. 2, 10, and 11, T. 26 N., R. 6 E., Livingston County. It is situated on a gently undulatory upland plain which is bordered on the south and on the northeast by ridges of hills. The plain and hilly ridges

are composed of stony clay in which there are lenses and layers of sand and gravel. The clay is underlain by bedrock, which lies at shallow depths or even crops out in the vicinity and north and west of Fairbury but to the east and south it lies progressively deeper, so that at Paxton, for instance, the depth to bedrock is more than 200, possibly as much as 300, feet. The rock consists of successive layers of sandstone, underclay, coal, limestone, and shale; some of the coal is mined and some of the limestone has been quarried near Fairbury.

The city is bounded on the southeast by Indian Creek, which rises near Strawn, in the southeast part of the county, flows northwest along the front of the ridge south of Fairbury almost to the west county-line, thence north through a narrow gap in the ridge, and thence northeast past the town to join South Branch Vermilion River about two miles northeast of Fairbury. The creek has a narrow floodplain which is bordered at most places by a terrace 6 to 8 feet high. Remnants of a second terrace about 12 to 15 feet above the floodplain occur at a few places and merge into the upland plain only a few feet higher. Numerous gravel pits and other exposures show that gravel and sand underlies practically all of the floodplain and composes all of the terraces along the lower course of the creek except at a few places where the floodplain cuts across bedrock or stony clay and at others where the upper terrace is composed of stony clay, and that it comprises a wide belt along the upper course of the creek in front (south) of the ridge south of Fairbury. A thin mantle of blackish silt covers all of the floodplain.

Geological Interpretation. The stony clay and gravel were deposited from a huge sheet of ice, or glacier, that long ago spread out from Canada over northern United States. As the glacier moved along, it picked up the soil and rock over which it passed. When the glacier eventually melted away, some of this drift material settled as an unsorted mixture of all kinds and sizes, forming the stony clay known as till, and some was carried away in the water flowing from the melting ice, sorted, and deposited as gravel, sand, and silt. Hilly ridges of glacial drift, known as moraines, were built up at the margin of the glacier whenever it remained stationary for any length of time and more or less regular plains were formed while it retreated steadily. Some of the gravel deposits were made by such short and local streams that they form only pockets or lenses in associated till; others form extensive plains in front of the moraines or fill the valleys through which the melt water escaped. Inasmuch as there was not a single advance and retreat but successive readvances and retreats of the glacier, some of the gravel deposits were buried by later drift and form extensive subsurface deposits.

Significance. The deposits of sand and gravel in the glacial drift are prolific sources of water, the amount that can be derived from any one deposit depending first on the size and extent of the deposit itself and second on the extent of the area that naturally drains into the deposit. Practically all farms, including those around Fairbury, and many towns in central and northern Illinois obtain their water supplies from deposits of glacial gravel.

Problem. At present the City of Fairbury derives its municipal water supply from subsurface waterbearing bedrock strata penetrated by three wells, two of which are more than 2000 feet deep and the third is more than 1500 feet deep. Because the cost of operation of the pumps in these wells is excessive and because the mineral content of the water is so high and of such nature that it is not only not wholly satisfactory for general use but also corrodes the mains and meters and thereby adds extra expense for maintenance, the city officials are considering the possibility of obtaining a substitute water supply from shallow wells, and they are formulating plans to submit such a project for federal financing under the National Industrial Recovery Act.

In an attempt to locate a satisfactory water supply to be provided by shallow wells within the city limits, a test-well was drilled on the south side of Locust Street, between 6th and 7th streets, or in lot 6, block 20, of the original town. The well passed through yellow and blue clay to a depth of 29 feet where it encountered a 7-foot bed of water-bearing gravel. For a test the well was pumped continuously for 8 days at a rate of more than 150 gallons per minute, reaching a maximum of 200 gallons per minute. According to this test, the well should provide plenty of water for the municipal supply but an analysis of a sample of the water revealed a mineral content of 860, which is too high to be satisfactory, and with iron and magnesia too high to be tolerated.

A second test-well was drilled in the gravel terrace along Indian Creek on the Munz farm, in the NE. 1/4, SE. 1/4, sec. 10, T. 26 N., R. 6 E. An analysis of the water from this well showed a total hardness of 394.

The city officials desire to know if and where a satisfactory municipal water supply may be obtained from shallow wells.

Opinion. The geologic conditions demonstrate that a wholly satisfactory municipal water supply for Fairbury can be obtained through shallow wells located in the floodplain and terraces along Indian Creek.

All (with the exception of that which evaporates) of the rainfall in the area lying between the morainic ridge south of Fairbury and another moraine just beyond the south county-line (a distance of 4-5 miles), extending from beyond Strawn on the east to beyond the west county-line on the west (a distance of more than 12 miles), and including the slopes on either side, drains to and through Indian Creek. Much of this water does not drain away directly during and after storms but soaks into the gravel along the creek, which thus serves both as a large natural subsurface reservoir and as a natural filter bed. Having no other avenue of ready escape, all of this water is forced to flow out through Indian Creek or through the gravel which underlies its floodplain and composes the terraces along it. Therefore wells located in the floodplain and terraces will intercept this flow and thereby provide a constant supply of water more than adequate for the present municipal needs of Fairbury and of low mineral content. The volume and constancy of yield from the gravel is indicated by the fact that whenever the natural flow in Indian Creek becomes insufficient to supply the railroad at its tank east of town, water is pumped into the creek from the gravel pit on the Munz farm - a pump with a capacity of 1500 gallons per minute is used and operated continuously - the water in the pit is drawn

down about 5-6 feet and remains at that level and when pumping ceases it rises at a rate of about one inch per day.

It is possible that a satisfactory water supply might be developed from buried gravel deposits lying within the city limits, but inasmuch as (1) an extended series of test-wells would be required to prove that the deposit had adequate extent and yield, (2) analysis of water from such a deposit reveals a mineral content unsatisfactorily high, and (3) the quality of water and constancy of yield from such deposits would always be questionable, consideration of such possible deposits seems hardly justified in view of the fact that a wholly satisfactory supply can be assuredly obtained from the deposits along Indian Creek just beyond the south limits of the town.

Recommendations. Although wells anywhere in the flood-plain and terraces along Indian Creek will intercept the same flow water through the gravel along the creek, it is recommended

I. That wells for a municipal supply be located south of town, preferably somewhere along First Street extended, in order to avoid any possibility of pollution from the sewer discharges farther downstream. Several favorable sites for a pumping and treatment plant occur practically at the edge of town.

II. That in order to ascertain the precise limits of the gravel deposit and thereby to determine the most advantageous location for the wells, a series of test-borings not more than 3-4 feet deep should be made across the valley at the proposed location of the pumping plant, and in order to ascertain the character of gravel and flow of water and thereby to determine the most efficient number, size, and equipment of wells, a single

test-well should be made in what appears to be the most advantageous location.

Postscript. Since the last conference, I have been informed that an analysis of a sample of water from a test-well 33 feet deep, which I assume is the test-well recommended above, reveals a total mineral content of only 307 with no magnesia and with iron barely above the limit of tolerance. This is a very acceptable ground water.

Fairbury City Officials

May 1, 1933 to May 1, 1934

Mayor .....George H. Franzen
City Clerk .....L. B. Decker
City Attorney .....Elmer G. Henning
City Marshal .....Granville Bodley
Supt. Water Works .....Roy Dickson
Supt. of Streets .....Andrew Hlavas
Park Custodian .....M. N. Jones
Fire Chief .....S. A. Demler
Board of Health .. { Dr. E. F. Law
Dr. W. A. Marshall
Dr. A. H. Thatcher

COMMITTEES

Finance—R. A. McAllister, J. C. Kessler, Alva Carter.

Judiciary and Insurance—The Mayor, L. S. Henderson, J. C. Kessler.

Fire and Water—J. C. Kessler, Emil Keller, O. A. Wait.

Lights—L. S. Henderson, Emil Keller, Alva Carter.

Licenses—Alva Carter, R. A. McAllister, J. C. Kessler.

Streets, Alleys and Drainage — R. A. McAllister, J. C. Kessler, O. A. Wait.

Parks and Public Buildings—Emil Keller, L. S. Henderson, O. A. Wait.

Band—Emil Keller, L. S. Henderson, The Mayor.

FAIRBURY

Ramsey · Lewis · Shaw · Bennett · Kelso · McDowell · Taylor · Peor · Beach · Huber · Boltz · Odell · Rudd · Compton · Morris · Webber · Crouch · Zimmer · Darnall · Bartlett · Spence · Albatt · Besgrove · Pursley · Cem · Westervel · Brooks · Howarth · Travis · Warrick · Davenport · Knaur · Kuntz · Hall · Illinois

TOLEDO

Qal · Qcr · Qld · Qct

Gr · Gr Ls · Ls · Val · T

22 · 23 · 27 · 28 · 29

F2 · F3 · F5 · W · F · CR

11 - Solid rock usually encountered } blue clay

Indian Creek

McLEAN COUNTY

CROPSEY No. 1