University of Wisconsin-Extension

GEOLOGICAL AND NATURAL HISTORY SURVEY
3817 Mineral Point Road
Madison, Wisconsin 53705

M.E. Ostrom, State Geologist and Director

A GEOLOGICAL STUDY OF THE WATER-BEARING PROPERTIES OF THE SANDSTONE AND OUTWASH DEPOSITS AT EAU CLAIRE

by

E.F. Bean

Open-File Report 30-2
17 p.

1930

U.S. data on Water around Eau Claire

A GEOLOGICAL STUDY OF THE WATER-BEARING PROPERTIES OF THE SANDSTONE AND OUTWASH DEPOSITS AT EAU CLAIRE

by

E.F.Bean

October 9, 1930

INTRODUCTION

This study was undertaken at the request of the Citizens' Water Supply Committee of Eau Claire. They directed that the geology of the vicinity be studied in order that the most promising sources of water supply could be located.

Five days were spent in field work, during which time the area immediately adjacent to the city was studied. No time was spent in the well settled part of the city.

I wish to express my appreciation for the hearty cooperation of the Committee; the City Council; Mr. Brown, Waterworks Superintendent; Mr. Meyer, City Engineer. The Committee supplied a large amount of data. The excellent report of Mr. Charles B. Burdick, of Alvord, Burdick and Howson, was especially helpful. While my conclusions differ from his, it must be borne in mind that his assignment was to examine "the Eau Claire Water Works particularly with reference to the iron and manganese contained in the well water and with a view to advise as to the most feasible means of eliminating these objectionable substances".

CONCLUSION

The geological evidence together with well data indicate that the city of Eau Claire should be able to secure an ample supply of excellent soft water free from objectionable amounts of iron and manganese. Further chemical and engineering studies must be made to check the accuracy of this conclusion.

GEOLOGY OF THE EAU CLAIRE REGION

The early surface rock of this region was granite. On the somewhat irregular surface of the granite, a considerable thickness, probably several hundred feet, of sandstone was deposited in Cambrian time. Erosion by streams cut valleys in the sandstone leaving an uneven, hilly country. During the glacial period, the Eau Claire and Chippewa valleys were filled by outwash sand and gravel to a height of about 900 feet above sea level or 135 feet above the river level, thus more or less completely disrupting the pre-glacial drainage system.

The sand and gravel completely buried all sandstone hills below the 900 foot level. Mt. Simon rose but a few feet above this plain, as did the sandstone hills in the northwest part of section 28 and the low mound in the SW¼ NW¼ of 29. The Eau Claire river filled its valley to the new level. Side streams such as Lowe Creek and Otter Creek were blocked by the glacial flood and their valleys were occupied by temporary lakes which were gradually filled by sediments carried in by the side streams. The clays found south of the Drummond Packing Plant were probably deposited in such a blocked valley.

As the ice sheet retreated northward, the load of sand and gravel diminished and the streams were enabled to deepen their channels and carve systems of terraces. In the process of establishing a new drainage system the streams did not in all cases find their old channels. As a consequence rock was encountered and falls or rapids resulted. It is quite likely that the water power of the region is due entirely to the failure of the rivers completely to readjust themselves to their old channels. The post-glacial Chippewa at Eau Claire took a new course across a neck of rock on the west side of Mt. Simon. In its post-glacial meandering the

river has excavated much of the valley fill. Delle Lake, Half Moon Lake and Little Niagara Creek occupy such meanders[1]. Sand dunes have developed on some of the terraces. Those at Forest Hill Cemetery and south of the river in sections 30 and 25 are particularly well defined.

WATER BEARING FORMATIONS

The following quotations are from U.S. G.S. Water Supply Paper 489, Pp. 117 and 118.

"Gravel. Gravel is the best kind of formation to yield water. In the United States it supplies most of the strong wells and furnishes more water to wells than all other materials taken together. A coarse clean gravel has a high porosity, high permeability and high specific yield. It absorbs water readily, stores it in large quantities, and yields it to wells freely."

"The best and most permanent gravel beds are produced from materials that have been transported long distances and have passed through many vicissitudes, so that the soft and unstable materials have disappeared and only the hard, insoluble, and durable materials remain."

"As a rule the water from gravel beds is of good quality unless it was mineralized before it entered the gravel. The water receives relatively little mineral matter from the gravel because the gravel is commonly composed of stable materials and, moreover, its interstices are so large that the water does not come into very close contact with the rock material."

"Sand and Sandstone. Sand and sandstone rank next to gravel as water bearers. They comprise some of the great aquifers of the United States, such as the well-known St. Peter and Dakota sandstones. A sand or sandstone formation is as a rule more continuous and widespread than a bed of gravel or conglomerate. It has a comparable porosity for the same degree of assortment and cementation, reaching 30 to 40 per cent or even more in clean uncemented sands of uniform grain. It compares unfavorably with gravel, however, in having smaller interstices and hence in conducting water less readily and giving up a smaller proportion to wells. It also compares unfavorably in consisting of smaller particles, which are more readily carried by the water into the wells, thus producing some of the

---

1. At the present time the waves in Delle Lake are actively cutting away from the north the narrow neck of fill which connects the east bluff across the old valley to the bluffs on the west side. As a matter of public safety this problem should be given attention as this erosion if allowed to continue will endanger the Omaha Railroad, private property and city streets.

most difficult problems in connection with drilling and pumping. A good sandstone well may yield a few hundred gallons a minute, but on an average sandstone wells furnish distinctly less water than wells supplied by gravel."

The city of Eau Claire has two excellent sources of water, the glacial sand and gravel and the Cambrian sandstone. The sand and gravel is a better source than sandstone mainly because it is likely to furnish a more abundant supply of water.

QUALITY OF WATER

The ideal water is colorless, odorless, tasteless, and free from objectionable quantities of mineral matter. At Eau Claire we are particularly concerned with iron and manganese. Water without carbon dioxide does not have the capacity to take iron and manganese in solution. Underground water is derived from rainfall. In its passage through the air rain water takes up a certain amount of carbon dioxide gas, and in its passage through the soil it takes up much more. The gas thus absorbed enables the water to absorb mineral matter. It appears that if a supply of water can be obtained which carries only a small amount of carbon dioxide, that water supply will carry little iron and manganese. The outwash terraces and the Cambrian sandstone seem to offer great promise since the soil cover is thin and there are no upland marshes. Therefore, the water would not carry much carbon dioxide, and therefore would have a low content of iron and manganese. No evidence of iron was observed in the upper terrace gravels. There is some iron stain near the top of Mt. Simon. Elsewhere, very little iron was observed in the sandstone.

"The rather limited evidence at our disposal seems to indicate that the underflow from the bluffs is comparatively free from iron and manganese. This would be indicated by the character of the water at the Wheaton Springs, the supply at Chippewa Falls and the comparatively low iron and manganese content of the Chippewa and Eau Claire Rivers. It seems probable that the presence of the objectionable iron and manganese in the water is acquired largely in its passage from the toe of the bluffs to the stream in its passage across the river bottoms." Burdick report Pp. 27 and 28.

The obvious solution seems to lie in intercepting the water before it has an opportunity to absorb carbon dioxide in the river flat. Wells sunk in the upland, well away from the river offer every promise of furnishing water satisfactory as to quality.

PRESENT CITY SUPPLY

If it is true that the outwash gravel is an excellent source of water, the question might well be asked "Why then, is the present supply not satisfactory since it comes from gravel?"

The answer to this question is outlined in the following quotation from the report of Prof. Chas. S. Slichter, January 19, 1924.

"The present water supply is taken from sands and gravels found among the river deposits in a wing of bottom lands northwest of the city. These deposits are of a usual type, consisting of very irregular masses of sands, gravel, clay, mud and peaty masses, all shuffled and imbricated in a very haphazard manner. Small streaks or pockets of iron and manganese mineral are not uncommon."

The city wells are located on a low terrace, deposited by the river in geologically recent times. The river eroded sand and gravel from bluffs upstream and built the low terrace in the quieter water downstream. It is natural that under such conditions organic matter would be deposited with the sand and gravel. With organic matter present it is natural that iron and manganese should accumulate in the gravel. Peaty masses and iron coated gravel were observed in the test pits on the low gravel bench near Shantown bridge. Iron stained gravel was observed in the gravel pit east of Michigan Street, a short distance north of Sherman Creek.

Mr. Brown kindly furnished me the following data regarding the wells.

No. 1. Majority of points in sandstone at 36 feet. Water comes from overlying gravel. 300 feet northwest of No. 1 sandstone is encountered at 37 feet.

No. 3. Sand and gravel to 115 feet. At 115 feet encountered blue clay. At 121 feet granite.

No. 4. (Original). Test pumping showed black sediment. (This may have been manganese or organic matter. E.F.B.)

No. 5. Sand and gravel to 56 or 57 feet where about 14 inches of clay was encountered.

No. 6. Sand and Gravel.

No. 8. (New) Sandstone at 77 feet.

The data in the following table were obtained from the report of the National Board of Fire Underwriters, February 1930 and from Mr. Burdick's report.

Well No.	El. Sta. Floor	Elev. above pool level	Depth of Well	El. Pump
1	801	5.4	40	756
2a	797	2.4	40	730
2b	797	2.4	65	732
3	800	5.4	100	784
4	804	9.4	100	736
5	803	8.4	65	738
6	804	9.4	65	784

Elevation Pool level above dam (Burdick) 796.5
Elevation Pool level above dam (U.S.G.S.) 794.6

Mr. John Marx was at the city plant when part of the water came from Wheaton Springs. At the city plant, pits were dug about 15 feet in the gravel and points sunk in the bottom of the pits. Under normal conditions the bottom of the pits was dry. When the river was raised to run logs, the water was about 2½ feet deep in the pit.

From the meager data available it appears that (1) There are deposits of iron and manganese in the gravel. (2) There is organic matter in the gravel. (3) Some water is derived from the river. It thus appears that the setup is such as to furnish the water carbon dioxide, thus making it possible for iron and manganese to be taken in solution.

It seems, therefore, that Mr. Burdick is entirely correct in his conclusions: "The present ground water supply will never be satisfactory until the iron and manganese are eliminated."

WATER RESOURCES OF EAU CLAIRE

Having been assigned the problem of studying the geological environment of Eau Claire with the end that the most favorable sources of water supply might be indicated, the writer was impressed by the fact that Eau Claire is particularly fortunate in the number of sources of water available. There are:

1. River Water. The Chippewa River water with suitable treatment would make a good source of supply. The Eau Claire river would also be a good source of supply if a sufficiently large part of its drainage area could be purchased and safeguarded. This clearly is too expensive.

2. Spring Supply. A spring water supply is exceedingly difficult to protect from contamination. For that reason no consideration was given to this source.

3. Ground water. It appears that this source gives the most promise of furnishing to the city a supply of water satisfactory as to quality and quantity and without the necessity for a filtration plant.

GROUND WATER AT EAU CLAIRE

As indicated in the geological description above, the geological conditions at Eau Claire appear especially favorable to securing a supply of water from underground sources. The underlying granite is, of course, hopeless as a source of water in quantity. The Cambrian sandstone is made up to a large extent of quartz grains. The quantity of water to be won from the sandstone is limited by two factors, the small size of the pore space and the fact that the sandstone is relatively thin, probably not over 300

feet as a maximum. The enormous terraces of outwash sand and gravel are exceedingly favorable. The materials are the end product of a long period of transportation by running water. Only the most insoluble rocks and minerals are left. For this reason the water receives little mineral matter in its passage through the gravel. The deposit is sufficiently porous to afford free passage of water. An especially favorable factor is that drainage of a very large sandstone area is toward the Chippewa River, thus affording excellent possibilities for a large quantity of good water. The headwaters of Lowe Creek are 12 miles south of the City limits. The underground conditions of this area provide splendid filtration.

Data were collected from 46 wells, nearly all which are in the outskirts of the city. A complete file of this data is appended to this report. A study of the well records and the geology of the area shows four areas worthy of further study. These are listed in the order of their geological importance.

1. The southwest area. In this area we have the records of wells 11, 12, 13, 45 and 46. All of these records report water that is of excellent quality. All but No. 13 derive their supply from sand and gravel. Number 11 has been pumped at the rate of 1,000,000 gallons per day. No. 13 has been pumped night and day without indicating a decrease in supply. This area appears to be capable of supplying sufficient water for the whole city. Only the higher part of the terrace in section 30 should be considered. The lower terrace should not be considered because of the possibility that with heavy pumping the content of iron and manganese might increase.

The water supply of Chippewa Falls is derived from similar gravels. They have chosen to develop the supply near the base of the gravel bluff.

There is no apparent reason why they should ever be troubled with iron or manganese. (From the geological standpoint there is no reason why they could not have developed an equally good supply by sinking wells in the outwash gravel at a point at least a mile nearer the city). Geological reasoning indicates that Eau Claire can develop a water supply in the southwest outwash area that is equal in every respect to the supply at Chippewa Falls.

In this area wells should tap the water that supplies the springs along Little Niagara. Wells have an advantage over the springs in the fact that the water does not pass through marsh and that there is no chance of contamination.

2. Northwest Area. Except for the Asylum Well, records 32-44 are all from sections 7 and 18. All of these records report water of excellent quality. The Asylum well No. 35, the Moholt well, No. 32, and the Huntzinger well No. 33, give indications that the quantity is abundant. All three of these wells derive water from the sandstone. It appears possible that a supply sufficient for the entire city might be developed.

3. Northeast Area. This is the Seymour ridge area. The water here is derived from sandstone. The old quarry would furnish an excellent site for a well. Records 1-4 and 26 are from this area. The water is of excellent quality. The Drummond Packing Company well No. 26, furnishes the best data on the yield of the sandstone in this area.

4. East Area. This is the east half of section 31, an area of outwash overlying sandstone. All reports show water of excellent quality. No information is available regarding quantity. On the basis of glacial geology this outwash is not so favorable as the southwest area. It was probably deposited by the Eau Claire river and is, therefore, more sandy than the Chippewa outwash.

QUALITY OF UNDERGROUND WATER

As outlined above the geological conditions favor the finding of a supply free from iron and manganese. In his reply to Judge Wickham, Mr. Burdick says. "It is probably true that by making investigations, sufficiently extensive, isolated places could be found where the water would test free from iron and manganese, but the history of your own supply seems to me abundant proof that after you had abandoned your present wells and located new wells at such apparently favorable places, there would be no assurance that your investment would be permanently valuable, at least, I know of no way to assure it."

There is a possiblity that the iron and manganese content will increase with heavy pumping. Mr. Burdick has stated: "It seems probable that the presence of the objectionable iron and manganese in the water is acquired largely in its passage from the toe of the bluff to the stream in its passage across the River bottoms." If the water is intercepted before it reaches the bottom, the chances for absorption of iron and manganese seem to be greatly reduced. As I have pointed out the chemical set-up is wrong at the City wells. I believe the set-up is favorable at each of the four areas outlined. As insurance, however, a procedure should be followed which will make it reasonably safe for the city to develop a new supply. No large investment will be required until it appears that the venture will be a success.

OUTLINE OF RECOMMENDED PROCEDURE

1. Test quality of existing wells. Samples should be analyzed to determine whether these waters under present pumping conditions are satisfactory chemically. The following wells are recommended for test.

(1) Southwest.
- Eau Claire Sand and Gravel No.11
- Platty No. 12
- De Long No. 45
- Stern No. 13

(2) Northwest
- Meholt No.32
- Huntzinger No.33
- Asylum No. 36

(3) Northeast
- Ganzer No.4
- Berger No. 26

(4) East
Capstick No. 18
Manthis No. 23
Texaco Filling Station No. 19
County Shop No. 20

2. Determine capacity of certain existing wells in each area.

(1) Southwest. This district has a splendid capacity test in the Eau Claire Sand and Gravel well. The De Long well would be a good well to test.

(2) Northwest. The asylum well affords a good opportunity for a capacity test.

(3) Northeast. The Berger well appears to be the best one to test in this area.

(4) East. The well at the county shop is most convenient. In this test in addition to determining capacity, the elevation of the water at the beginning and at the end of the test should be determined. The well data collected do not give much accurate information regarding the height of the water table.

3. Engineering Investigation. If the investigation outlined in 1 and 2 indicates that one or more of the areas offer promise, an engineer should be employed to formulate plans and to direct exploration. On the basis of quality and capacitytests outlined above, he will be able to determine which area best fits the present and future needs of the city. He can then outline a plan for developing a new supply. It is possible that he may recommend the development of two or more areas. There are advantages in such a plan. If there is any possibility that the new supply will develop iron and manganese, thus necessitating a filtration plant, then the development of a single area is advisable.

GENERAL NOTES

In all engineering work, drilling wells, street construction, laying of water mains and sewers, etc., a careful record of materials encountered should be kept. This will develop an exceedingly valuable file, which will assist greatly in the planning of subsequent work.

Lake Hallie. The water supply at this Park is derived from three points in sand and gravel on the lake shore at the foot of a 100 foot sand and gravel bank. If the public is using this water, bacterial counts should be made, and the wells inspected.

Wheatum Springs. These are located at the base of the sandy gravel bluff in the SW¼ SE¼ of section 31, T.28-R.9W. There is some marshy ground along the base of the bluff - hence opportunity to gain CO_2 and iron. This impresses me as a splendid site for a very beautiful city or county park.

Little Niagara Springs. If the public is using these Springs, bacterial counts should be made.

Carson Park has a core of sandstone with a covering of sand and gravel. Wells here should be tested at frequent intervals.

DATA ON WELLS AROUND EAU CLAIRE

Numbers -1-16 Collected by

Citizens Committee

Observers--Stubenvoll, Miller. Accompanied by Sweet and Meyer.

Numbers 17-46 Collected by E.F.Bean accompanied by Meyer and Members of the Citizens Committee.

No.1

a. Date--September 7, 1930.

b. Name of owner--Lenfesty.

c. Location--Home Gardens Addition.

d. Drilled by--Frank Sweet.

e. When--August, 1930

f. Size--4½ inch.

g. Depth--140 feet.

h. Approximate ground sea level--900.

i. Pump data--2 3/4 inch cylinder.

j. Geological data--62 feet sand and gravel, 70 feet sand rock, 20 feet water bearing rock.

k. Observations on water--Water odorless. Clear. Taste, good.

l. Special remarks--

No. 2

a. September 7, 1930.

b. Guy Clark.

c. Home Gardens Addition, Morningside Drive.

d. Olsen of Altoona.

e. June, 1930.

Data on Wells Around
Eau Claire No.2 (cont.)

f. 4½ inch.

g. 137 feet.

h. 940 feet

i. 2½ inch cylinder.

j. 34 feet casing

k. Water odorless. Taste, neutral. No sediment. No scum with use of soap.

l. Mrs. Clark says, "Darn good water."

No. 3

a. September 7, 1939

b. Gorton Place

c. Home Gardens Addition

d. Sweet

e. July, 1936

f. 4½ inch

g. 132 feet

h. 940

i. 2½ inch cylinder. 30 to 33 feet casing.

j. 30 to 36 feet sand and gravel. 75 to 80 feet dry rock. 20 feet water bearing rock.

k. Water odorless, clear, soft. Taste, neutral.

No. 4.

a. September 7, 1939

b. Gunsar

c. Home Gardens Addition--Conrad Street

d. Sweet

e. 1938

Data on Wells Around
Eau Claire No.4 (cont.).

f. 4½ inch

g. 160 feet

h. 940

i. 2 3/4 inch cylinder. 30 to 80 feet of casing.

j. 50 to 80 feet sand and gravel. Approximately 60 feet sand rock. 20 to 30 feet water bearing rock.

k. Probable calcium deposit (white) in teakettle. Very clear, soft, neutral taste, odorless. With soap, forms clear suds. Laundry results, white--no spotting.

No.5.

a. September 7, 1930

b. Lokem

c. Old Chippewa Road SW of Center Section 4, T.27-R.8W.

d. Harrington

e. 1923

g. 90 feet

h. 880

i. Cased all the way down

j. Casing bedded in gravel. Sand and gravel, full depth. Possibly old river formation.

k. No trouble in kitchen utensils. Some iron deposit shown in teakettle. No scum in laundry use. No red water. Taste, neutral. Water, clear.

l. During dry spells there is periodic color in water; but Mrs. Lokem says water was good during 1930 dry spell.

No. 6.

a. September 7, 1930

b. Hutchinson School center 33, T.28-R.8W.

c. Old Chippewa Road--½ mile north of city limits.

d. Sweet

e. September, 1930

Data on Wells around
Eau Claire No.6 (cont.)

f. 4½ inch.

g. 118 feet

h. 391

i. 2½ inch cylinder. Casing 109 feet. 60 mesh screen, 2 inch x 48 inch.

j. All sand and gravel. Surface indications are that originally area was of swamp formation.

k. Iron indications—no doubt of presence of iron. Slight odor. Slight characteristic iron taste.

l. Old well at this place, 30 feet deep. Water very bad.

No. 7

a. September 7, 1939

b. St. Patrick's Church

c. West side of Chippewa River, about 1000 feet from river.

d. Sweet

e. September, 1939

f. 4½ inch

g. 57 feet

h. 339

i. 2½ inch cylinder. 60 mesh screen

j. Sand and gravel to 8 feet. Gravel hard pan, 8 to 40 feet. Water sand, 17 feet.

k. Water odorless. Taste, neutral. Very soft. No iron indications.

l. Follow up with water test.

No. 8

a. September 7, 1939

b. C.S.Bunce

c. 1618 Menomonie Street-Mt. Washington District.

g. 130 feet

Data on Wells Around
Eau Claire No.8 (cont.)

j. Sand rock

k. Taste, neutral. Clear. No odor. Slight traces of iron in teakettle.

l. Laundry work white and clear.

No. 9

a. September 7, 1930

b. Ellingson

c. Menomonie Street—Mt. Washington District

f. 4½ inch

g. 101 feet

i. 16 feet of casing. Balance in sand rock.

j. Sand rock

k. Water slightly cloudy. Faint odor characteristic of iron. Apparently high iron.

No.10.

a. September 7, 1930

b. Mearle Estate

c. Washington Street

d. Natural spring.

j. Coming from sand rock

k. Water clear, odorless. Taste, neutral. Faint traces of iron in teakettle. No staining of laundry. No scum with soap. No rim on bath tub.

l. No black water noted in this location from city supply.

No.11

a. September 7, 1930

b. Eau Claire Sand and Gravel Company

c. Milwaukee right of way, ½ mile north of south city limits.

f. Four 6-inch points

Data on Wells Around
Eau Claire No.11 (cont.)

g. 80 feet

h. 770

i. Electrically driven pump. Well points 10 feet long. Driven well

j. Sand and gravel

k. Tasteless, odorless, clear. No indications of iron.

l. Wells have been pumped continuously at rate of 750 g. p. m. with no observable drawdown.

No. 12

a. September 7, 1939

b. Fletty

c. Half mile north of south city limits, and 1½ miles west of State Street--on second bench above Chippewa River.

e. Very old well

f. 5 to 6 inches

g. 114 feet

h. 340

i. Screen on bottom. 68 feet long

j. Sand and gravel, full depth. Well bottoms in gravel.

k. No laundry staining. No scum on tubs. Rust indications in water and use. No iron indications on tasting of water. Some iron indications in teakettle. (See l).

l. Pipes rust rapidly. Water apparently very soft and attacks iron easily. Supply of water reported by Fletty unlimited.

No. 13

a. September 7, 1939

b. William Stein

c. Clairemont Avenue--3/4 mile west of State Street

e. Deepened in 1915.

g. 120 feet

h. 330

i. Cased 30 or 70 feet

j. 60 or 70 feet sand and gravel. Balance hard rock, probably sandstone.

k. Very soft. Some rust in teakettle--came in use three years. No linen staining. Taste, good. Color, good. Temperature, low.

l. Original well, 130 feet deep. Rust indications in teakettle--probably deposit carried from piping due to disintegration of same in soft water. No question of quantity of water. Gasolene driven pump operated night and day with no loss of quantity.

No. 14

a. September 7, 1939

b. Rudolph--present owner, Natch

c. Southeast corner of city limits

d. Very old well

f. 8 inches

g. 100 feet

h. 910

i. 3 inch cylinder. No point.

j. 18 feet of gravel. Balance, sand rock.

k. Clear, colorless. Taste, neutral. Very soft.

l. Unlimited quantity of water. Piping replaced lately. Attendant at farm thinks he can taste iron, probably from rusting of pipes. Black iron pipe used. Mr. Natch thinks there is iron in the water. Follow this up with test.

No.15.

a. September 7, 1939

b. Shoals

c. East city limits, ½ mile north of south limits

g. 30 feet

h. 885

i. Well fully cased

Data on Wells Around
Eau Claire No.15 (cont.).

j. Soft sand rock near surface. Balance, sand rock.

k. No staining of clothes. No iron indications. Odorless, tasteless. Quite soft, though some hardness.

l. Flow of water through underground formation can be heard.

No. 16

a. September 7, 1930

b. Goff

c. Rudolph road, 1/8 mile south of Plank Hill road

d. Old dug well

e. 1900

g. 115 to 120 feet

h. 880

i. Point driven in bottom of dug well 6 to 8 feet

j. Bottom is in sand rock

k. Taste, bad. Some odor. Slight hardness. Water riley after standing unpumped for a day or so.

l. Well contaminated years ago. Contamination treated by depositing a considerable quantity of lime. Present indications of contamination due to entrance of seepage and foreign matters. Bacterial test shows water contaminated. Mr. Goff stated that in his opinion the indications were that the water in the well comes from the springs along Minnow Creek, which would be from 500 to 1000 feet from well location with intervening ground from 10 to 20 feet higher than surface at well, with Minnow Creek about 10 feet above Chippewa River level.

No. 17

a. October 3, 1930

c. NW corner NE-NW-NE 32, T.27-R.9W.

g. 100 feet?

h. 884

j. Surface sand and gravel. Depth of gravel not known. Well bottomed in sandstone. Water table near surface, probably within 40 feet.

Data on Wells Around Eau Claire

No. 18

a. October 3, 1930

b. Mrs. Steuber - Renter H.S. Capatick.

c. SW¼ SE¼ of 21 east of intersection Rudolph Road and Harding Avenue.

g. 120 feet or more. Driven well.

h. 837

j. Probably all sand and fine gravel. Depth to water table not known.

k. Good water. No iron.

No. 19

a. October 3, 1930

b. Tennee Filling Station

c. Outside city limits on north side of T.H. 12.

g. 120 feet

h. 837

j. All sand and gravel. Water table at depth of 100 feet.

k. Water colorless, clear, soft and free from iron.

No. 20.

a. October 3, 1930

b. County Shop

c. Highland and Fairfax

g. 120 feet

h. 832

j. No rock

k. Water good.

Data on Wells around Eau Claire

No. 21

a. October 3, 1930

b. E. F. Neill

c. Corner Altoona and Enterprise.

g. 140 feet

h. 300

j. No data probably sand

k. Soft water, no iron.

No.22

a. October 3, 1930

b. Barnum

c. South of Altoona between Keith and Birney

g. 110 feet

h. 300

j. All in sand

k. Water good

No.23

a. October 4, 1930

b. Martin Manthis

c. South of center of 21, T.27 R.8W.

f. 4½" casing. Well drilled. Operated for years without point. Now has point.

g. 120 feet

h. 300 feet (approx).

J. No sandstone.

k. Water good, no iron. Supply sufficient for farm needs.

No. 24

a. October 4, 1930

b. E.M. Fisher

Data on Wells around
Eau Claire No.24 (cont.).

c. North part of NE¼ SE¼ 21, T.27-R.9W.

g. 30 feet

h. 385 (approx.).

j. Sand - owner not certain

k. Water good.

No. 25

a. October 4, 1930

b. Drummond Packing Company

c. Near center of S½ of section 16

f. 14". Casing 12" cased to 128'.

g. 152 feet

j. Surface sand 5', sandstone 142, blue clay 3', granite 4'. (Report to U.S. Dept. Ag.). Mr. Drummond reports 10' surface sand, 110' sandstone, 8' conglomerate, 22' clay clear blue, 3' granite. Saw sample of cuttings, red granite and gray gneissic granite all fresh.

k. Quality of water good. No iron. Capacity of pump 80 gal. per minute.

No. 26

a. October 4, 1930

b. Mr. Berger

c. North of Seymour Road near east City limits.

e. 1926

f. 6"

g. 202 feet

j. All in sandstone. Cased to 18'. 77 feet of water. No drop in pumping.

k. Soft water, no iron.

Data on Wells around
Eau Claire

No. 27

a. October 4, 1930

b. Joe Federhen

c. Seymour Road east of Hastings

e. 1918

g. 139 feet

j. No data. Sand and gravel at surface

k. Water good, no iron

No. 28

a. October 4, 1930

b. Spellum

c. South of Seymour - east of Starr.

e. 1919

g. 142 feet

h. 884 (approx.)

j. Sand and gravel 58 feet. Sandstone 58 to 142

k. Water good, quantity large.

No. 29

a. October 4, 1930

b. Meyer

c. Starr south of intersection with Seymour

g. 156 feet. No other data

h. 884 (approx.)

No. 30

a. October 7, 1930 Letter from Carl Meyer

b. Harry Frisk

c. 300 feet N. of ¼ corner of section 9.

g. 110 feet

Data on Wells around
New Claire No.29 (cont).

h. 865

j. Sand and gravel except for a layer of clay near bottom. Water below clay. Red water during certain years in past. Supply large.

No. 31

a. October 7, 1930 Letter from Carl Meyer

b. Due east of No.30 on east side of See Mine.

g. 150 feet

h. 886 (approx.)

j. Sand and gravel except a clay bed at 120 feet.

No. 32

a. October 2, 1930

b. Kohalt

c. West side of 14th near Mead extended

f. 6" casing

g. 120 feet

h. 878 (approx.)

j. 80 feet sand and gravel, 80 feet sandstone. Cased to sandstone. Water table down 22 feet.

k. Abundant water, no material drawdown. Soft water. No iron

No. 33

a. October 4, 1930

b. Huntsinger

c. Folsom and 14th

f. 6" casing

g. 180 feet at least

h. 878 (approx.)

i. Inside pipe rusting. 4" cylinder.

j. Gravel on surface. Depth to sandstone not known. Water table down not more than 25 feet.

Data on Wells around
Eau Claire No.33 (cont).

k. Good water. Owner calls it hard. Never pumped dry with 24 hour pumping.

No. 34

a. October 4, 1930

b. Ole Tronstad

c. West of 14th north of Cordon extended

g. 30 feet

j. 18 feet gravel, 64 feet sandstone, 30 feet of water.

k. Soft water, no iron. Temp. 50°.

No. 35

a. October 4, 1930

b. Asylum

f. 8" casing

g. 800 feet

j. Sandstone

k. Abundant water, probably 50,000 gal. per day. No trouble with iron or lime. 30-00 feet of water.

No. 36

a. October 2, 1930

b. Jaffers

c. NW¼ NW¼ 7, T.27-E.9W.

g. 122 feet

j. 16 feet surface sand, 106 feet sandstone

k. Water soft, no iron except from pipes.

No. 37

a. October 4, 1930

b. C.J.Severson

c. West of 11th between Cedar and Fountain

g. 60 feet

Data on Wells around
Eau Claire No. 37 (cont.)

j. Driven well - sand and gravel.

k. Water soft, no iron. 20 feet of water.

No. 38

a. October 4, 1939

b. Olson

c. Fountain east of 11th

g. 36 feet

j. 75 feet gravel and sand, 9 feet sandstone.

k. 56 feet of water.

No. 39

a. October 4, 1939

c. Next house east of No.38

g. 38

j. Sand. Water at 30 feet

No. 40

a. October 4, 1939

c. West of 11th north of Fountain

g. 32 feet - Driven well

j. Sand

k. Good water. 12 feet water. Next house north about the same. Depth 34 feet.

No. 41

a. October 4, 1939

c. .645 N. 11th

e. August, 1912.

g. 106 feet

j. Well driven to sandstone

k. No trouble with iron, water soft, supply abundant.

Data on Wells around
Eau Claire

No. 42

a. October 4, 1930

c. Folsom west of 11th

g. 70 feet. No other data

h. 875

k. Water good

No. 43

a. October 4, 1930

b. Robert Kuehn

c. South side of Folsom east of 8th.

g. 681 feet deep.

h. 875

j. Meyer says 6 feet to sandstone.

k. Abundant good water.

No. 44

a. October 4, 1930

b. Chicken Shack. Mr. Pollard, Owner.

c. Corner 9th and Truax.

g. 82 feet

h. 879 (approx.)

j. Sand and gravel at surface. 80 feet of casing. Geology not known.

k. Water clear, soft.

No. 45

a. October 2, 1930

b. O.E. De Long

c. NE¼ SE¼ 30, T.27-R.9W., near NE corner.

e. January, 1930

f. 4", cased to bottom

g. 124 feet.

h. 989 (approx.)

j. All in sand and gravel. Bottomed in pea gravel.

k. Soft, no iron.

No. 46

a. October 2, 1930

b. Stein, owner, Occupied by renter.

c. NW¼ SW¼ 30, T.27-R.8W.

e. 1927

g. 90 feet

j. Sand and Gravel

No. 47

a. October 3, 1930

b. Altoona Well

c. At foot of sandstone hill south of village.

e. 1918 or 1919.

f. 6" casing

g. 190 feet

h. 920

i. 5 3/4" cylinder. Pump leather lasted six years.

j. All in sandstone, bottom shot. 36 feet of water in April 1930. No shortage of water. No iron.