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Water supply - Vienna, Illinois - correspondence and report. 1934

Thwaites, F. T. (Fredrik Turville), 1883-1961

[s.l.]: [s.n.], 1934

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J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET
CHICAGO

CENTRAL 9129

Res. Beverly 7401

November 26, 1934

Re: Vienna, Illinois Water Supply

Cameron, Joyce & Company
17 South Seventh Street
Keokuk, Iowa

ATTENTION: Mr. G. E. Smith
Vice-President

Gentlemen:

Answering your letter of the 24th instant in which you state that you have arranged with Prof. Thwaites to go with me, if possible, to Vienna, Illinois, and with further reference to our telephone conversation on the morning of the 24th in this connection.

35
Saturday evening Prof. Thwaites called me and we made tentative arrangements to go to Vienna together or be there at the same time and last evening we made definite arrangements as to the day which will be Saturday of this week, as it works out to best advantage for each of us. I have made a reservation for Prof. Thwaites on Illinois Central Train Number 9 to leave Chicago at 11:05 PM November 30th, arriving at Anna, Illinois at 6:05 AM December 1st where Mr. Weis will please be kind enough to meet him at the Illinois Central Station. This reservation is made in the name of Thwaites. Prof. Thwaites may return from Anna at 10:56 PM that day, arriving at Chicago at 7:15 AM December 2nd, Sunday.

Prof. Thwaites may come down from Madison on Friday either on "Milwaukee" Train Number 146 at 5:00 PM, arriving at Chicago at 8:50 PM, or he may come down on Train Number 508 of the Northwestern at 5:10 PM arriving at 9:00. Respectively, he may return to Madison from Chicago on Sunday morning on Number 131 at 8:20 AM arriving at 12:15 PM, or on Number 501 at 10:00 AM arriving at Madison at 1:30 PM.

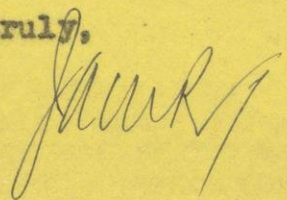
Driving from Paris, Illinois, I will be on Friday at Austin, Indiana, plant of the American Can Company and as early as possible on Saturday morning at Vienna where I will look up Mr. Wallace Weis. It is probable that I will be there by or about 9:00 AM.

I am delighted at the opportunity to have Prof. Thwaites with me in connection with this project inasmuch as I had intended to confer with him before making any further report to you.

Yours very truly,

JAMR/ljm

cc Mr. Wallace Weis, Vienna, Ill.
cc Prof. F. T. Thwaites, Madison, Wis.



OFFICERS

THOS. H. JOYCE, PRESIDENT
GEO. E. SMITH, VICE PRESIDENT
JAMES M. JOYCE, SECRETARY
JAMES CAMERON, TREASURER



DIRECTORS

THOS. H. JOYCE
JAMES CAMERON
GEO. E. SMITH
JAMES M. JOYCE

CAMERON, JOYCE & Co.

RAILROAD AND GENERAL CONTRACTORS

17 SOUTH SEVENTH STREET
KEOKUK, IOWA

December 28, 1934

Mr. F. T. Thwaites
R. F. D. 4
Madison, Wisconsin

Dear Sir:

We are attaching our check in the amount of \$97.85 in payment for services and expenses in connection with the Vienna, Illinois Water Works.

Will you kindly receipt and return your bill to us for our files.

Yours very truly,

CAMERON, JOYCE & COMPANY

Thos. H. Joyce
President

MC

sent copy of bill Jan 4. 35

Cameron, Joyce and Company, Dr.

to

F. T. Thwaites, Consulting Geologist, R. F. D. 4, Madison, Wisconsin

Professional services, two days (Dec. 1, 1934 plus time
in preparing report) at \$35.00 per day \$70.00

Expenses

R. R. fare-round trip to Anna, Ill.	\$17.78
Sleeper, both ways	5.50
Meals, taxi, etc.	2.50
Telephone to Chicago	.70
Postage, blueprints, photographs, typing	<u>1.37</u>

27.85

\$97.85

Vienna, Illinois, water supply

Dec. 22, 1934

Cameron, Joyce and Company,
17 South Seventh St.,
Keokuk, Iowa

Attention of Mr. G. E. Smith, Vice President

Gentlemen:

Enclosed please find my bill for services and ~~is~~ expenses
in connection with the Vienna, Illinois, water supply.

I greatly appreciated the opportunity to make the trip down
into "Egypt" and trust that you have found the results satisfactory.
If at any time I am able to serve you again will be pleased to do so.

With the best wishes of the season,

Very truly yours,

F. T. Thwaites

Please address reply to my residence office, R. F. D. 4, Madison, Wis.

J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET
CHICAGO

CENTRAL 9129

December 18, 1934.

Prof. F. T. Thwaites,
211 Science Hall,
University of Wisconsin,
Madison, Wisconsin.

Dear Prof. Thwaites:-

In tardy reply to your letter of the 8th instant in connection with charges:-

I am enclosing a copy of my letter and invoice to Cameron, Joyce and Company. If it helps you, I am glad.

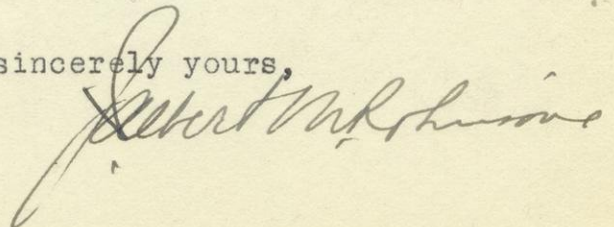
My little business was started while I was with a contracting concern and as a result, I charged upon the assumption that as it was not an all-time business, the rates should be lower than for cases where it was a man's only means of support. This was back in 1916, and I charged \$2.50 per hour, considering a day out of Chicago as ten hours whether I was on the job one or eighteen hours - always plus expenses. I went into business for myself in 1923 and started charging under the same conditions but at \$3.00 per hour. At that time, I commenced to divide up office expenses at the end of the month and charging each for his portion. I kept getting this charge for time higher and higher until it reached \$5.00 per hour, then as the "era of inefficiency" commenced to show its teeth, I got it down in small steps to the present \$4.00 per hour. I pay my assistants \$1.80 per hour and charge \$2.50, plus expenses.

I do not know what to tell you, except that I think that you ought to charge at least from \$3.00 to \$3.50 per hour, considering a day out of Chicago as ten hours, plus expenses.

I work out the "Sec'y - Steno" charge in this way:- For November this amounted to 3.9 percent of time charge, or 86 cents for these people. For December, it will probably be 8 percent or \$4.00 in this case. This is really overhead, covering office-service, etc., a total of \$50.00 per month, spread over all accounts.

I hope that the information I have given you above will be of help, and wishing you and Mrs. Thwaites a very Happy Christmas with the kiddies, I am

Very sincerely yours,



JMR:LJM

Subject Water Supply - Vienna, Illinois.

INVOICE

No. V-2-1234a

J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET
CHICAGO

CENTRAL 9129

December 18, 1934

Services rendered to:—

☐

Cameron, Joyce & Company
17 South Seventh Street
Vienna, Illinois.

☐

In connection with subject
at upper left for period:—
In full to date.

☐

☐

Personal service:— 18.0 hours at \$4.00

\$ 78.00

Service of assistants:— None

Purchases made and paid for:— None

Net paid expenses, such as traveling, telephone, telegraph,
secretarial-stenographic services, drawing materials, blue-
printing or other reproduction and incidentals:—

Traveling	22.95
Communication	3.80
Sec'y.-Steno	4.86

\$109.61

For payment by December 22, 1934,
discount of 2% of time portion, or a
\$1.58, will be allowed.

J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET
CHICAGO

CENTRAL 9129

December 18, 1934.

Cameron, Joyce & Company,
17 South Seventh Street,
Keokuk, Iowa.

Attention of Mr. G. E. Smith, Vice President.

Gentlemen:-

At the time you directed me to report on the Vienna, Illinois, water supply matter, I did not tell you the basis upon which I operate, intending to write you at once. However, as I was put to considerable work to take care of your wants promptly and at the same time keep peace with those from whom I was preparing to take time, I did not do it.

All of my work is done on a time and expense basis, I charging \$4.00 per hour for personal time plus all net paid expenses such as traveling, telephone, telegraph, secretarial-stenographic service, reproduction, etc. For a whole day out of Chicago, I charge for only ten hours, although sometimes I am on the job eighteen hours. Invoices are sent at the end of each month for the time and expenses in that month, and, although payment is assumed to be made at once, a discount of two percent of time portion is granted if payment is made within ten days. In cases where a transaction is evidently completed, it is possible to invoice before the end of the month.

The enclosed invoice is in full to date and covers the following charges for time in hours:-

November - including all work and study here and trip to Urbana to Geological Survey	5.5
December - the trip to Vienna	8.0
Reporting upon return	<u>4.5</u>
Total time	18.0 hours

It will be noted that only eight hours is being charged for the Vienna trip, the other two being charged for trip to Urbana.

Travelling expenses to Urbana and Vienna are charged upon the railbasis of the Chicago-Anna round trip with sleeper each way.

It has been a pleasure to serve you and I trust that I will have the opportunity to help you further. Would it not be a good idea for you to let me look over plans and specifications on water-works jobs for you before you bid on them? Thus you might be saved a lot of trouble and expense.

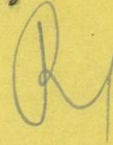
J. ALBERT M. ROBINSON
CONSULTING ENGINEER

Cameron, Joyce & Company - Page 2.
CENTRAL 9129 228 NORTH LA SALLE STREET
CHICAGO

December 18, 1934.

Wishing you a very Happy Christmas, I am

Yours very truly,



JMR:LJM

COPY



THIS SIDE OF CARD IS FOR ADDRESS



Prof. F. T. Thwaites,

University of Wisconsin,

Madison,

211 Science Hall.

Wisconsin.

Just noticed that I did not complete reservation data, which is Car 49 Lower 4.

JAMR.

Vienna, Ill. water supply

Dec 3, 34

Mr. L. E. Workman,
State Geological Survey,
Ceramics Bldg.,
Urbana, Illinois

Dear Mr. Workman:

Could you please send me as soon as possible a copy of the log of the deep well at the Vienna Court House or any other deep well nearby. I would like this in order to make a cross section through the city showing the relation of the formations to the probable salt water table.

I had an interesting day at Vienna in company with Mr. Robinson and the representative of the contractors. In all it was a trip of over a thousand miles but I enjoyed it and learned some physiography as well as some geology!

With best regards to you and the others at Urbana,

Sincerely,

F. T. Thwaites

Block G SA 33, 805-853, 1922

^{street}
Keller J G 28, 281-303

395-416

Englemann

- 10 5 Cypress M. rather fine - even beds - non stained 100 ft
- 9 2 Galeonda lime & sh 150
- 8 3 Hardensburg - massive, fine like cypress M 60-100 ft - gone to NW
- 7 4 Glen Dean ls 40-75
- 6 5 Tar Springs - variable - locally massive & cliff making shale parting - coral down to 40 gone to NW
- 5 6 { Vienna - ls. cherty - black shale 60
- 4 { Waltersburg sh pinkish out to W 60-70
- 3 { Menard ls 75
- 2 7 Palatine ss 40-80
- 1 { 8.9-10 Clove ls 30-40
- 11 Regonia ss thin bedded shaly 100
- 12 Richard ls 60-140

Englemann, Henry. Johnson Co. geol. Survey of Ill.,
vol 1, pp 376-409 1866

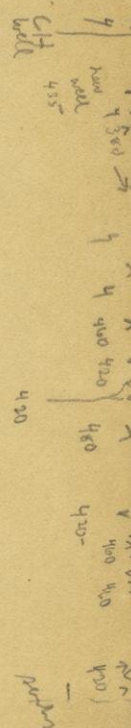
See pp 77-78

- 1 sil. ls 25-30 ↑
 - 2 sh & ss 80-90 ↑
 - 3 shy ss 15-18
 - 4 ss 40
 - 5 ls 45
 - 6 sh & ls 45-70
 - 7 ls (local) 20-30
 - 8 ss & sh 15-20 fine grain to 150'?
 - 9 ls & shale 150
 - 10 Cypress M 120
- 1500

SEW 33-13-3
ss 40 No 8
slope 54
ss 12 No 10
158 slope 44
See 19, 13-2 is No 8

- See in SW 19-13-3 on my sec. T7.640
slope 20 ss?
- 5 ss No 6 5 Tar Springs same 615
 - 7 { ls & sh 44
 - sh 29
 - ls 7 1/2
 - slope 24
 - ls 5
 - slope 40
 - sh 5
 - ls 1
 - sh 7 to No 8

not observed



SW 4 - 12-2

slope 50 - eg frag 50
 slope 25
 slope - er frag 15
 er 21
 slope 15 & n 24
 er 8
 slope 12
 15 30
 slope 22
 15 12
 slope 6
 slope 12

Springs p 405

NE of Reynoldsburg - Cedar Cr
 NW 34 - 11-4

from 50' area of 12-12-4 Little Bay Creek
 noted watery place

Iron bearing water used for malom

NE 30 & SW 28 - 13-3 upper part of No 6 ~~also SW~~ loc off
 probably 20

See 19, 20, N pt 28 and No 6 & 7 13-3

N pt of 28 - few feet of No 6 is over 100' No 7 is.

See 21 No 7 goes underground.

Hill in Vienna = No 3 is = Tar springs
 No 4 to 10' above stream

NE 16 - 13-3

SS No 4 28 Tar Springs

Glen Doan 75

slope SS? 8
 sil 15 No 5 14
 slope 28
 slope 15 & SS 25
 Nos.

slope - No 6 ss 20 Handenberg

Gen 18 - 12-3 Tall Tree

Wt 720
 slope 60
 SS Potter 8
 slope 57
 n 2 40
 15 22
 slope 20
 " 20 sh
 15 18
 15 24

NE 18 13-3

Top 540+
 Tar sp. 520

Glen Doan 68

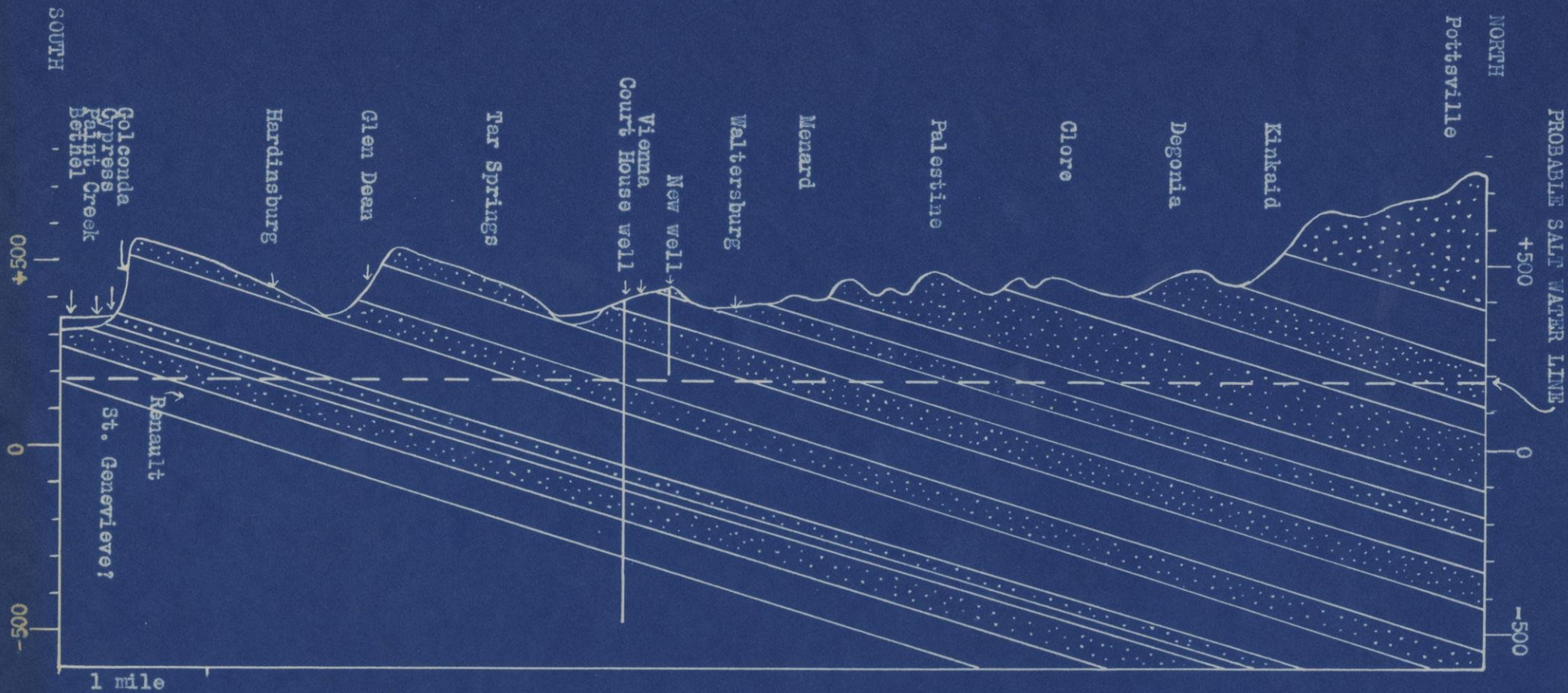
Handenberg 72

Slope No 4 2
 ss " 20
 15 No 5 5
 slope 45
 15 8
 sh 10
 SS No 6 8
 coal -
 SS, sh 25

SS, shaly & sh 14
 SS white, fine (No 6)
 25

Gen rec, Johnson to
 Winkaid - Deponia, Ohio
 1 er 144-170
 2 SS palest 120-150
 3 15 Menard 60
 4 ss Waltersb 50-80
 5 er in Vienna 68

6 ss 72-100 Tar sps 10
 7 er 156 Glen Doan
 8 ss 125-250 Handenberg
 9 15 62 Golconda
 10 ss 12 cypress
 894-1108



GEOLOGIC SECTION NORTH -SOUTH THROUGH VIENNA, ILLINOIS

F. T. Thwaites, Dec., 1934

Sandstone with shale partings - dots
 Limestone and shale - open

personal

WATER SUPPLY AT VIENNA, ILLINOIS

F. T. Thwaites, December 6, 1934

WATER SUPPLY AT VIENNA, ILLINOIS

F. T. Thwaites, December 6, 1934

Introduction.-- In response to instruction by telephone from Mr. G. E. Smith of Cameron, Joyce and Company the writer visited Vienna, Illinois on December 1, 1934 in company with Messers J. Albert M. Robinson of Chicago and Wallace Weis, the local representative of the aforesaid company. As much investigation as time and the state of the roads permitted was made of the surrounding country and published information pertinent to the subject was looked up before and after the visit.

Geology.-- Vienna is situated in the unglaciated part of Illinois south of the coal-bearing rocks whose border forms a high escarpment a few miles north of the city as shown in the accompanying section and photo 1134. The bed rock under the city is covered by a few feet to possibly 50 feet of loose clay most of which was derived by weathering from the underlying rock into which it grades. Some of this material has, however, been worked over by wind or by water. Bed rock lies deepest under the stream bottoms. The bed rock is the "Chester group" which consists of alternating layers of sandstone, limestone, and shale. Few of these layers are over 100 feet thick but the more conspicuous units have received formation names, largely as a result of studies by the late Stuart Weller of the University of Chicago. The rock formations slope (dip) to the north at an angle between one to two degrees (about 140 feet per mile). The sandstones reach the surface mainly

in steep slopes and locally form cliffs almost all of which face the south or southwest. The tops of the hills slope gently to the north or northeast and form low "hog-backs". (Photos 1136, 1137). It is thus possible within a few miles south of Vienna to inspect at the surface all of the formations which occur under the city. Parts of the rocks are, however, concealed by soil and more accurate information is obtainable from the logs of wells.

Log of well drilled by G. W. Varner for Cameron, Joyce and Co. Oct. 5 - Nov. 9, 1934.
Information from Wallace Weis and L. E. Workman
Elevation about 435

	Thickness	Depth
	feet	feet
Chester		
Surface		
Clay, yellow	8	8
Waltersburg		
Sandstone, fine-grained, yellow	16	24
Vienna		
Shale, dark gray, caves	24	48
Limestone, dark gray, very hard, crevice at bottom with water	20	68
Limestone, cherty, dense	12	80
Shale, black, dolomitic	7	87
Tar Springs		
Sandstone, very fine-grained, light gray, no water	30	117
Shale, black, caves	11	128
Sandstone, some shale partings, white, very fine-grained, no water	29	157
Shale, black, caves	13	170
Sandstone, very fine-grained, gray, some shale, no water	7	177
Glen Dean		
Shale, black	13	190
Limestone, black	7	197
Limestone, dark gray, very hard	18	215 total depth

Log of well in court house square, Vienna, abbreviated from record furnished by L. E. Workman, State Geological Survey
Elevation about 400

	Thickness	Depth
	feet	feet
Surface		
No record	12	12
Chester		
Vienna		
Shale	24	36
Tar Springs		

	Thickness feet	Depth feet
Tar Springs		
Sandstone, very fine-grained, gray to black, some shale layers	34	70
Shale, gray to black	9	79
Sandstone, very fine-grained, gray	32	111
Shale, dark gray, dolomitic	7	118
Sandstone, very fine-grained, gray to black	7	125
Glen Dean		
Shale, dark gray	30	155
Limestone, gray to black	13	168
Shale, blue-gray, calcareous, with layers up to 4 feet thick of gray Limestone	27	205
Limestone, gray to black	11	216
Shale, dark gray to black	15	231
Herdinburg		
Sandstone, very fine-grained, gray	31	262
Shale, gray	3	265
Sandstone, very fine-grained, gray	25	290
Sandstone, gray	10	300
Golconda		
Limestone, gray, with many layers up to 9 feet thick of gray shale	97	397
Shale, gray, calcareous	43	440
Cypress		
Sandstone, gray, mixed with black shale	60	500
Paint Creek		
Shale, black	18	518
Bethel		
Sandstone, gray to white, layers of black shale	100	600
Rensselt		
Limestone, gray	12	612
Shale, gray to black	88	700
Lower Mississippian		
St. Genevieve (?)		
Limestone, gray, some shale	135	835
Shale, black	20	855
Limestone, gray, layers of black shale	28	883 total depth

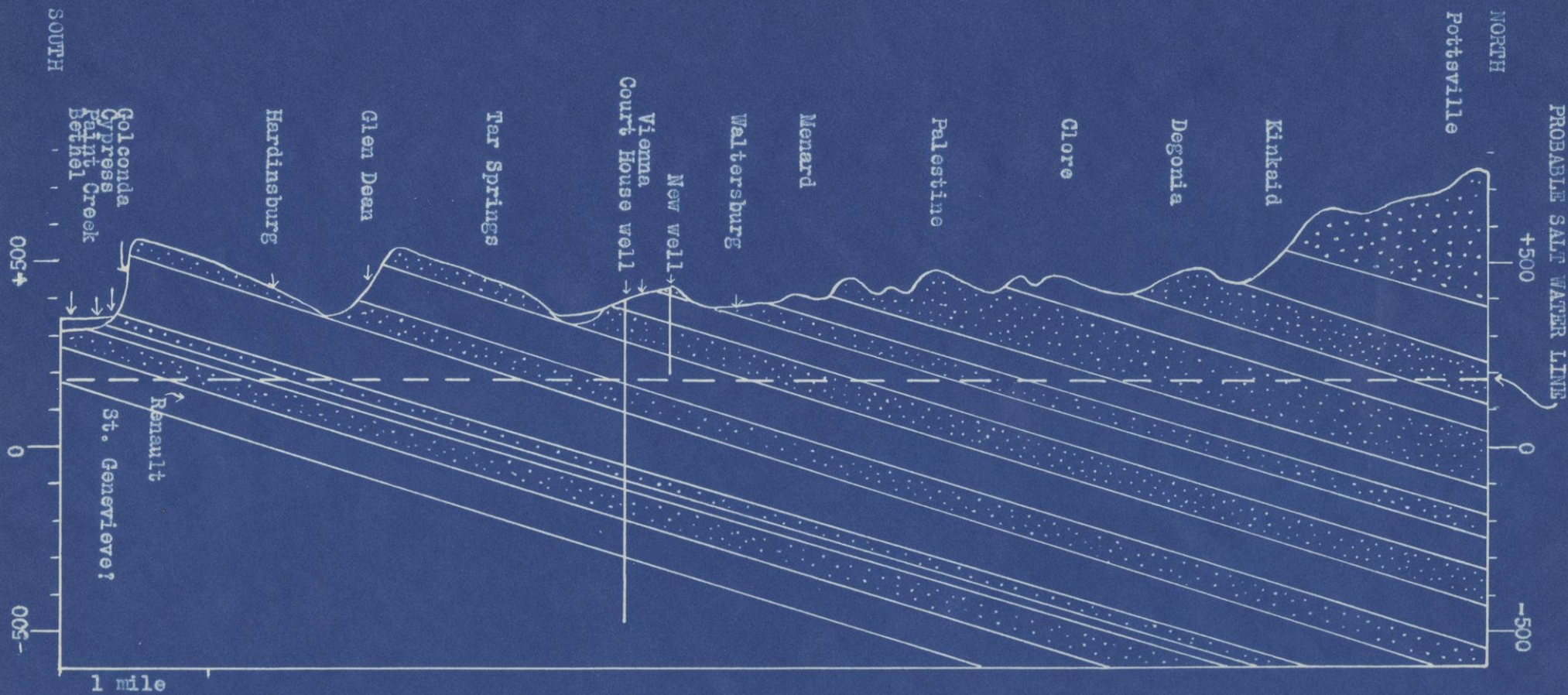
Attention should be drawn to the fact that the well logs show little or no good water-bearing sandstone formation at any depth below Vienna. Most of the shale layers save badly and soon fill a drill hole unless cased off.

Occurrence of underground water.-- Underground water occurs (a) in the pores between the grains of sandstone and (b) in crevices chiefly in limestone. It is evident from the above well logs and from inspection of outcrops that most if not all of the sandstones at Vienna are so fine grained and well cemented that they can contain no substantial amount of water. In City Well No. 1 no measureable amount of water was obtained in the Tar Springs sandstone. Its outcrop area south of the city is covered with clay and at several points water from a recent rain could be seen in pools and streams indicating a very small amount of absorption. The log of the Court House well demonstrates that almost all of the sandstones are broken up by layers of shale, some of which are several feet thick. The fact that this well and that at the Big Four station were drilled so deep is a certain indication that the drillers were not satisfied with the amount of water in the shallower formations. In the new well a crevice at 68 feet depth appeared to supply almost all of the total yield of slightly less than 4 gallons per minute. Although some wells in other regions obtain large yields from crevices, it seems improbable that such can be obtained at Vienna because the layers of brittle rock are separated by so many layers of soft caving shale in which large openings are very rare if present at all. Crevices increase in abundance toward the surface but on account of the clay soil are all filled with that impervious material (photo 1139). Alluvial deposits in the valleys (photo 1138) are probably all fine sand and silt. Little if any coarse sand is present in the region and the streams have too gentle a current to have ever deposited

a substantial amount of gravel. It is, therefore, very improbable that large amounts of underground water exist below Vienna.

Quality of underground water.-- No chemical analyses of underground waters in Vienna are available, but from information collected by Mr. Weis it is clear that all wells much over 200 feet deep encountered salt water. In order to use the Court House well it was necessary to plug it at about 200 feet, that is in the Glen Dean formation. Water from the deep well of the Big Four railroad could not be used in locomotives on account of salt. The diagram (p. 6) gives a cross section which runs from north to south through the Court House well. It is very probable that the sandstone layers are not as continuous as here drawn. The dotted line gives the probable surface of salty waters. All of these rock formations were deposited under the sea. The original sea water has been washed out to very moderate depths because of (a) their low porosity, (b) the fact that the formations dip to the north and are there sealed off by higher rocks thus allowing no escape for the salt water, (c) the low relief of much of the country which causes little active circulation of underground waters (photos 1152 and 1158), and (d) the rather slightly porous soil cover (photo 1158) which sheds much of the rain. The only water investigated contains considerable iron. All shallow waters under the city are or may be contaminated by seepage or if on low ground by floods. It is, therefore, concluded that potable underground water can be found at Vienna only in wells which do not much exceed 200 feet in depth and that all of it is subject to contamination.

Exploration for underground water.-- Records furnished by Mr. Weis are as follows:



GEOLOGIC SECTION NORTH -SOUTH THROUGH VIENNA, ILLINOIS

F. T. Thwaites, Dec., 1934
 Sandstone with shale partings - dots
 Limestone and shale - open

Court House well - plugged back to 200 feet - not enough water

First National Bank - 350 feet deep - salt water

Powells Cafe - 200 feet - dry

Sinclair filling station - 70 feet, cased 20 feet - yield probably not over 5 g.p.m.

Standard oil filling station - 150 feet, cased 100 feet - insufficient water

Big Four Railroad - 900 feet - salt water - abandoned

City Well No. 1 - 215 feet - 4g.p.m. - abandoned

Most of the inhabitants use cistern water although there are some shallow dug wells. The Sinclair well furnishes enough water for a small 9 inch ~~stroke~~ single acting pump which is no indication of enough water to supply the city. It may, however, be advisable to make a test of this in order to satisfy the people of the city of the actual yield. The writer is convinced from the results of the other six wells that it is next to impossible that two 60 g.p.m. wells could be developed in the built-up portion of Vienna and only remotely possible that such could be found in the immediate vicinity of the city. It is true, however, that the city could get by with a much less amount of water than that specified in the contract. A well yield^{ing} 25 g.p.m. day and night would undoubtedly supply all demand which can reasonably be forecasted. But to discover such a well would require a long and probably expensive program of test drilling which would probably have to be extended outside of the area in which it would be most economical to obtain water.

Alternative sources of underground supply.-- If test drilling is undertaken, it seems best to locate some tests on the lower slopes of the hills in hopes that water might be found in the

upper broken part of the bed rock. As explained above, however, this is a hope rather than a certainty, for it is apparent from photo 1138 that all crevices and openings near the surface of the bed rock are probably filled with clay. Furthermore, the supplying watershed would be in any place very small and the underground storage of water also limited. It is remotely possible that the sandstones north of the city, which do not form distinct hogback ridges are looser and more porous than those which underlie the city (see section, p. 6). It is more probable, however, that this failure to show in the landscape is due (a) to fine grain, (b) large amount of shale in these formations, and (c) discontinuity of formations. No data could be found which bear upon this question and it is certain that no accurate idea of the underground geology can be obtained without drilling. Study of the map indicates that adequate watersheds to supply water to the Pottsville sandstone, which is quite soft but contains many shale partings, are lacking within 8 miles of the city. If it were necessary to go that far it would be better to prospect for a well in the gravels which are shown on the geological map just south of Boaz. The potential possibilities of these gravels are unknown. The writer realizes that pipelines from such distant sources are not economically feasible unless either a large part of their cost were financed as a relief project or they could supply a number of towns. He ventures to suggest that intercity pipelines radiating from good adequate water supplies would answer the question of satisfactory water supply in many sections of southern Illinois could the cost of construction and operation be distributed over enough communities to render it tolerable. But in this part of Illinois cities are few and far between.

Surface water.-- The use of surface water from a reservoir on one of the streams naturally suggests itself, but the writer is convinced that the expense of constructing a proper treatment plant for rendering such water safe for drinking is too great to saddle upon such a small community. The difficulty and expense of getting an experienced man to operate such a plant also makes its use unwise. If not properly operated such a plant is useless and leads to a false sense of security.

Springs.-- Another possible source is springs, but the writer could learn of none nearer than the Pottsville escarpment several miles to the north. These springs are all reported to yield water which is very high in iron and would require treatment. A cave about 3 1/2 miles southeast of Vienna on the Metropolis road supplies a stream called Cave Creek. Such water would be unsafe and variable in amount.

Conclusions.-- In the light of existing knowledge the following conclusions are arrived at by the writer:

- (1) It is impossible for the contractor to complete two 60 g.p.m. fresh water wells in the city of Vienna.
- (2) It is improbable that even a 25 g.p.m. well could be completed in or close to the built-up portion of the city without a long and expensive program of test drilling.
- (3) If found, underground water will be hard and contain considerable iron which will make trouble in the distribution system. It will also require chlorination to make it safe for drinking.
- (4) Supplies from either (a) wells or springs in the larger areas of Pottsville sandstone to the north or (b) wells in the gravels to the south would be far too costly for a small community unless a large portion of the pipeline were paid for as a relief project and even if this were the case, operation would still be expensive.
- (5) Use of surface water is inadvisable in a small city and is expensive.

Science Hall

December 8, 1934

Mr. J. Albert M. Robinson,
228 North La Salle St.,
Chicago, Illinois

Dear Mr. Robinson:

I wish to thank you for the copy of your report on the Vienna, Illinois, water supply and for the enclosed note.

Enclosed please find a copy of my report less the photographs. I put in six of them in one copy in case it had to go to the P. W. A. for I thought they might help a stranger to understand the situation. Am putting in two others here which may interest you. Incidentally, the super-pan film is never quite as good as some others for distant views although you will admit it is fast when I tell you that the view of the quarry in shadow was entirely satisfactory.

I have not yet sent in my bill and will not until I hear further from you. In pre-Depression days I used to charge \$50. a day plus expenses. Lately most of the jobs have been for cities and for these I charged \$25. a day including expenses, that is I pay them myself. Of course, this job outside the state should be worth more but I still cant bring myself to charging the former price. The expenses will run considerably over \$25. but some items are not yet in. I do not quite follow your method of charging up expense but would infer that the maximum per day is only \$40 and not \$96. Would appreciate it if you will suggest a fair price as I do not want to undercut those who make a regular business of that kind of work. This year has been a good one for me and I do not want to spoil next year by either undercharging or overcharging.

Sincerely,

Science Hall

December 8, 1934

Cameron, Joyce and Company,
17 South Seventh Street,
Keokuk, Iowa

Attention: Mr. G. E. Smith, Vice-President

Gentlemen:

Enclosed please find two copies of my report on "Water Supply at Vienna, Illinois". I am sending two copies for it will probably be necessary to submit one to the P. W. A. in Chicago. The photographs were included with only one copy for I felt that they were not otherwise needed. If, however, you want prints for the other copy please advise me. I am also sending a copy to Mr. J. Albert M. Robinson.

Will render my bill in a few days as soon as I know the amount of certain expenses.

Very truly yours,

F. T. Thwaites

Prof. Thwaites,

You made a remark to me that you would charge these people \$50, including expenses. I don't think that is fair to you, even though you are a University staff member. I charge \$4 per hour for all time, and consider a day out of Chicago as 10 hours, plus expenses. You have done a lot of work before going and more after returning.

Just thought I would make the suggestion that you charge more for your services.

Regards,

J. A. ...

Munday or Thantiquang

Highway Dept. Wis.

BW Huiskamp - Madison

Wallace Weis

Vienna Ill.

Cameron Joyce & Co

Keokuk Iowa

228 N La Salle

Robinson

995 S Seelye ave

Beverly 7401

T.H. Light

Vienna

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MR BEIN=S

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CAMERON JOYCE AND CO.

*Address of S. G. Swaiter is
Science Hall, Madison, Wis.*

Telephone Your Telegrams to **Postal Telegraph**

J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET
CHICAGO

CENTRAL 9129

December 3, 1934

Re: Vienna, Illinois, Water Supply

Cameron, Joyce & Company
17 South Seventh Street
Keokuk, Iowa

ATTENTION: Mr. G. E. Smith
Vice-President

Gentlemen:

On the first instant, accompanied by your Mr. Weis and Prof. F. T. Thwaites of the University of Wisconsin, I visited the sites of the proposed supply and the surrounding country. I am more than ever satisfied with my first report to you, but hereinafter set forth in brief form the reasons for this condition.

On the afternoon of November 28th, I visited the State Geological Survey at Urbana, Illinois, having previously advised of my visit that certain information could be gotten ready. Prof. Thwaites had told me that the Survey possessed the unpublished work of Mr. Weller, Sr., University of Chicago, deceased, hence I was able to get the facts from this work and a good geological map of the area involved. This map shows the faults and outcrop areas of the Tar Springs, Waltersburg and Hardinsburg sandstones and the Vienna and Glen Dean limestones. I also learned that this town is some distance South of the edge of the glacier, hence gave up the hope before arrival at Vienna that there would be much possibility of securing water from the low lands or "flats" surrounding the City.

- 1 - Sandstones outcrop at elevations too high to collect any water except from the hilltop areas above them.
- 2 - Sandstones are too fine and densely cemented to permit water to readily travel in them, leaving the only possible means of passing water to lower collecting areas to small crevices. This means that most of the water that travels in the sandstones will do so only in the crevices which are not sufficiently open to give good results. The sandstones are so nearly impervious, even when weathered, that exposed ledges drain water from them rather than gather it.

J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET
CHICAGO

CENTRAL 9129

- 3 - The limestone sheets would not permit of much water traveling in their crevices as the crevices are not of the open type but are quite solidly filled with clay. The outcrop is too high to be of any value in gathering water.
- 4 - As the "flats" surrounding the town are made up of alluvial wash from the hills whence no gravel could come, the possibility of water traveling in this area or pocketing in it is very unlikely, hence water could not readily collect in crevices in either sandstones or limestones which dip beneath the "flats". In such deposits there might be some boulders on top of the solid rock (be it sandstone or limestone) but they are probably surrounded by clay, instead of gravel, hence would not collect water or allow it to pass to lower elevations. Some sand "lenses" or pockets might be found, but as such, they would yield very little water.
- 5 - The old river bed is a great distance to the South of the town and separated from it by a solid wall of nearly impervious sandstones, hence the possibility of either infiltration or beds of gravel and sand is too remote to be considered.
- 6 - Water obtained from any source would be subject to bacteriological contamination owing to the fact that the gathering areas are close to the town and subjected to contamination from surface drainage.
- 7 - None of the seven wells investigated or considered show any indication of producing an adequate supply of good water for municipal use. The only well that is of much consequence is the one at the Sinclair Station and it would probably not yield more than five gallons per minute if pumped continuously. The Court House well, according to information from a St. Louis driller, was plugged at 200 feet, hence does not produce salt water.
- 8 - The only sandstone in the area which would be loose enough to readily carry water is the Hardinsburg, but as it is very deep at

J. ALBERT M. ROBINSON
CONSULTING ENGINEER
228 NORTH LA SALLE STREET

CENTRAL 9129

CHICAGO

the Court House (according to the Illinois Geological Survey) any water which it might carry to the town would be saturated with salt.

- 9 - The numerous shales between the water-bearing formations largely prevent accumulation of water from various formations except at the well. To properly gather water from the numerous sources penetrated in a given hole requires construction not specified, but of a very costly nature. Construction as specified would soon give trouble, in fact, would probably not give satisfactory results for the year of guarantee.
- 10 - Water from sources like these is nearly always slightly corrosive due to the large amount of carbon dioxide in solution, as evidenced at the Sinclair Station, where iron stains the fixtures. This condition, in a new system, creates dissatisfaction and often leads to water-borne diseases on account of the growth and accumulation of crenothrix.

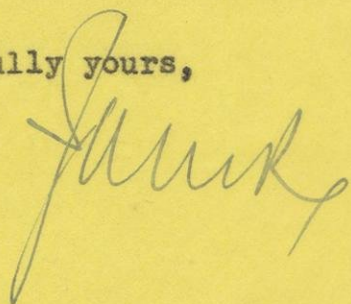
In my opinion, it will be impossible to get good results from any sub-surface source except by an extensive program of expensive prospecting, tests and progressive development in the alluvial deposits where sand lenses might be found. Such an undertaking is evidently outside of your agreement. I sincerely believe that no one well would deliver more than twenty-five gallons per minute. As the location of the supply governs the design of the distribution system, it would be the height of folly to install pipe lines until the supply is located.

Awaiting your further instructions, I am

Very respectfully yours,

JAMR/ljm

cc ✓ Prof. F. T. Thwaites
211 Science Hall
University of Wisconsin
Madison, Wisconsin



upper broken part of the bed rock. As explained above, however, this is a hope rather than a certainty, for it is apparent from photo 1138 that all crevices and openings near the surface of the bed rock are probably filled with clay. Furthermore, the supplying watershed would be in any place very small and the underground storage of water also limited. It is remotely possible that the sandstones north of the city, which do not form distinct hogback ridges, are looser and more porous than those which underlie the city (see section, p. 6). It is more probable, however, that this failure to show in the landscape is due (a) to fine grain, (b) large amount of shale in these formations, and (c) discontinuity of formations. No data could be found which bear upon this question and it is certain that no accurate idea of the underground geology can be obtained without drilling. Still farther north the Pottsville sandstone is quite soft and coarse grained but contains many shale partings. To the south of Boaz a formation which contains gravel is shown on the geological map. Its potential possibilities are unknown.

Surface water.- The use of surface water from a reservoir on one of the streams naturally suggests itself, but the writer is convinced that the expense of construction a proper treatment plant for rendering such water safe for drinking is too great to saddle upon such a small community. The difficulty and expense of getting an experienced man to operate such a plant also makes its use unwise. If not properly operated such a plant is useless and leads to a false sense of security.

Springs.- Another possible source is springs, but the writer could learn of none nearer than the Pottsville escarpment several

upper broken part of the bed rock. As explained above, however, this is a hope rather than a certainty, for it is apparent from photo 1138 that all crevices and openings near the surface of the bed rock are probably filled with clay. Furthermore, the supplying watershed would be in any place very small and the underground storage of water also limited. It is remotely possible that the sandstones north of the city, which do not form distinct hogback ridges, are looser and more porous than those which underlie the city (see section, p. 6). It is more probable, however, that this failure to show in the landscape is due (a) to fine grain, (b) large amount of shale in these formations, and (c) discontinuity of formations. No data could be found which bear upon this question and it is certain that no accurate idea of the underground geology can be obtained without drilling. Still farther north the Pottsville sandstone is quite soft and coarse grained but contains many shale partings. To the south of Boaz a formation which contains gravel is shown on the geological map. Its potential possibilities are unknown.

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32

Water supply at Vienna, Illinois

#1. Thwaites, December, 1934 32

Introduction In response to instruction by telephone from Mr. G. E.

Smith of Cameron, Joyne and Co. the writer visited Vienna, Illinois on Dec. 1, 1934 in company with Messers J. Albert M. Robinson ^(of) Chicato and Wallace Weis the local representative of Cameron, Joyce and Co. ^{the aforesaid company}

As much investigation as time and the state of the roads permitted was made of the surrounding country and all published information ~~and~~ pertinent to the subject was looked up before and after the visit.

Geology. Vienna is situated in the unglaciated part of Illinois south of the coal-bearing rocks whose border forms a high escarpment a few miles north of the city as shown in the accompanying section. ^{and photo 1134} The bed rock under the city is covered by a few feet to possibly 50 feet of loose clay most of which was derived ~~from~~ by weathering from the underlying rock into which it grades. Some of this material has, however, been worked over by wind or by water. Bed rock lies deepest under the stream bottoms. The bed rock is the "Chester group" which consists of alternating sandstone, limestone, and shale. Few of these ^{layers} are over ¹⁰⁰ ~~50~~ feet thick but the more conspicuous units have received formation names, largely as a result of studies by the late Stuart Weller of the University of Chicago. The rock formations slope (dip) to the north at an angle of ^{between one to} ~~about~~ two degrees ^{about 140°} as shown in the section. (100 to 200 feet per mile). The sandstones reach the surface ^{namely} in steep slopes and locally ^{from} cliffs ^{almost all of} of which face the south or southwest. The tops of the hills slope gently to the north or northeast ^{and} ^{part 1136, 1137} within a few miles south of Vienna ^{surface} It is thus possible to inspect at the ~~surface~~ all of the formations which occur under the city. ^{the formations} are ~~shown on the section.~~ Parts of the rocks are however, concealed by soil and more accurate information is obtainable from the logs of the wells drilled in the north part of the town.

Photo

Log of well drilled by C. W. Varner for Cameron, Joyce and Co.

Oct. 5 Nov. 9, 1934 Elevation about 435

Information from Wallace Weis and L. E. Workman

	Thickness	Depth feet
<i>Chester</i> Clay, yellow	8	8
<i>Chester</i> Waltersburg-sandstone, yellow, fine-grained	16	24
Vienna-shale, dark gray, cavy	24	48
Limestone, dark gray, very hard, crevice at bottom	20	68
Limestone, fi cherty, dense	12	80
Shale, black, dolomitic	7	87
Tar Springs-sandstone, light gray, very fine- grained, no water	30	117
Shale, black, cavy	11	128
Sandstone, some shale, white, very fine-grained, no water	29	157
Shale, black, cavy	13	170
Glen Dean Sandstone, gray, some shale	7	177
Shale, black	13	190
Limestone, black	7	197
Limestone, dark gray, very hard	18	215 total depth

Log of well at Court House (abbreviated) from record furnished by
L. E. Workman, State Geological Survey

	Thickness	Depth feet
Surface		
<i>Chester</i> Not stated	12	12
Vienna		
Shale	24	36
Tar Springs		
Sandstone, very fine-grained, gray, to black some shale	34	70
Shale, gray to black	9	79
Sandstone, very fine-grained, gray	32	111
Shale, dark gray, dolomitic	7	118
Sandstone, very fine-grained, gray to black	7	125
Glen Dean		
Shale, dark gray	30	155
Limestone, gray to black	13	168
Shale, blue-gray, calcareous, with layers up to 4 feet thick of gray limestone	27	205
Limestone, gray to black	11	216
Shale, dark gray to black	15	231
Hardinsville		
Sandstone, very fine-grained, light gray to dark gray	31	262
Shale, gray	3	265
Sandstone, very fine-grained, gray	25	290
Golconda Sandstone, gray	10	300
Limestone, gray, with many layers up to 9 feet thick of shale, gray	97	397
Shale, gray, calcareous	43	440
Cypress		
Sandstone, gray mixed with black shale	60	500
<i>Lower</i> Shale, xxx <i>Paint Creek</i>		
Paint Creek		
Shale, black	18	518

	Thickness feet	Depth feet
Tar Springs		
Sandstone, very fine-grained, gray to black, some shale layers	34	70
Shale, gray to black	9	79
Sandstone, very fine-grained, gray	32	111
Shale, dark gray, dolomitic	7	118
Sandstone, very fine-grained, gray to black	7	125
Glen Dean		
Shale, dark gray	30	155
Limestone, gray to black	13	168
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Hardinsburg		
Sandstone, very fine-grained, gray	31	262
Shale, gray	3	265
Sandstone, very fine-grained, gray	25	290
Sandstone, gray	10	300
Golconda		
Limestone, gray with many layers up to 9 feet to 9 feet thick of gray shale	97	397
Shale, gray, calcareous	43	440
Cypress		
Sandstone, gray, mixed with black shale	60	500
Paint Creek		
Shale, black	18	518
Bethel		
Sandstone, gray to white, layers of black shale	100	600
Renault		
Limestone, gray	12	612
Shale, gray to black	88	700
Lower Mississippian		
St. Genevieve(?)		
Limestone, gray, some shale	135	835
Shale, black	20	855
Limestone, gray, layers of black shale	28	883 total depth

Bethel	Sandstone, gray to white with layers of black shale	100	600
Renault	Limestone, gray	12	612
	Shale, gray to black	88	700
St. Genevieve(?)	Limestone, gray, some shale	135	835
	Shale, black	20	855
	Limestone, gray with layers of black shale	28	883 total depth

Occurrence of water underground water. Underground water occurs in

(a) the pores between the grains of sandstones and (b) ⁱⁿ crevices ^{deeply in limestone} ~~within~~ all kinds of rocks. It is evident from the above well logs and from inspection of outcrops that ^{most if not all} ~~few if any~~ of the sandstones at Vienna are ^{so fine} ~~sufficiently~~ coarse-grained and loose enough to contain ^{any} ~~any~~ substantial amount of water. In the well drilled by Mr. Varner no measurable amount of water was obtained in the Tar Springs sandstone. Its outcrop area south of the city is covered with clay and at several points water could be seen ~~both~~ in pools and streams indicating a very small amount of absorption. The log of the Court House well ^{demonstrates} ~~indicates~~ that almost all of the sandstones are broken up by layers of shale, some of which are several feet thick. The fact that this well and that at the Big Four station were drilled so deep is a certain indication that the drillers were not satisfied with the amount of water in the shallower formations. In the new well a crevice at 68 feet depth appeared to supply almost all of the total yield of slightly less than 4 gallons per minute. Although ^{some} wells ~~are known~~ in other regions where ^{large yields} ~~large yields are~~ obtained from crevices it seems improbable that such can be obtained at Vienna because the layers of ~~any~~ brittle rock are separated by so many layers of soft caving shale in which large openings are very rare if present at all. Crevices increase in abundance toward the surface but on account of the clay soil are all filled with that impervious material. (photo 1139)

It is, therefore, very improbable that ^{large amounts of} ~~underground waters~~ exist ^{large} ~~in~~ quantity below Vienna.

(alluvial deposits in the valley (photo 1138) are probably all fine sand and silt, little if any coarse sand is present in the region and the stream have too gentle a current to have ever deposited a substantial amount of gravel)

Quality of underground water. No chemical analyses of underground waters in Vienna are available, but from information collected by Mr. Weis it is clear that all wells much over 200 feet deep encountered salt water. In order to use the Court House well it was necessary to plug it at about 200 feet, that is in the Glen Dean formation. Water from the deep well of the Big Four railroad could not be used in locomotives. ^{on account of salt. (p. =)} ~~On the section the~~ [↑] ~~probable surface of salty waters is indicated.~~ [↑] All of these rock formations were deposited under the sea. The original sea water has been washed out to very moderate depths because of (a) their low porosity, ~~and~~ (b) the fact that the formations dip to the north and are there sealed off by higher rocks ~~and~~ thus allowing no escape for the salt water, ~~xx it is, x therefore x~~ (c) the low relief of much of the country which causes little active circulation of underground waters (photos 1132 and 1138) and (d) the rather slightly porous soil cover (photo 1138) which sheds much of the rain. ~~The only water investigated contains considerable iron.~~

It is, therefore, concluded that ~~fresh~~ potable underground water can be found at Vienna only in wells which do not much exceed 200 feet depth.

Exploration for underground water. Records furnished by Mr. Weis are as follows.

- Court House well-plugged back to 200 feet ~~and~~ not enough water.
 ~~for the building~~
- First National Bank-350 feet deep-~~and~~ salt water
- Powells Cafe-200 feet-dry
- Sinclair filling station-70 feet cased 20 feet-yield probably not over 5 g.p.m.
- Standard oil filling station-150 feet, cased 100 feet,-insufficient water
- Big Four R. R. ~~225~~ 900 feet -salt water-abandoned.
- City well No. 1-215 feet- 4 g.p.m.-abandoned

Most of the inhabitants use cistern water although there are some shallow dug wells. ^{none of the} It is, therefore, concluded that ~~the seven known~~ deep wells in Vienna has given any indication of a large amount of fresh water. The Sinclair well ~~alone~~ furnishes enough water for ~~the~~ a small 9 inch stoke single acting pump which is no indication of enough water to supply the city. It may, however, be advisable to make a ~~more~~ test of this

to next page

It is probable that all shallow waters under the city are or may be contaminated by seepage or if on low ground by floods.

and that all of it is subject to contamination as in all cisterns require the water must be hard.

NS? reported

The diagram (p -) gives a cross section of the underground formations from _____ to _____ as revealed by ~~the~~ the various wells that have been drilled. The dotted line gives the probable surface of salty waters.

1 2 4 P - 2 2 2 - 9
9 2 2 2 2

in order to satisfy the people of the city of the actual yield. The writer is ~~satisfied~~ ^{convinced} from the results of the other wells that

~~it is highly improbable~~ ^{next to impossible} that two 60 g.p.m. wells could be developed in the ~~vicinity of~~ ^{vicinity of} Vienna built-up portion of Vienna and only remotely possible that such could be found in the immediate vicinity of the city. It is true, however, that the city could get by with a much less amount of water than that specified in the contract. ~~25~~ A well yielding 25 g.p.m. day and night would undoubtedly supply all demand which can reasonably be forecasted. ~~But it is also very difficult to see where such a well could be found.~~ ^{But} To discover ^{such a well} ~~it~~ would require a long and probably expensive program of test drilling which would probably ~~have to be~~ ^{to obtain water} extended outside of the area in which it would be most economical ~~to drill a well.~~

Alternative sources of supply. ^{underground} If test drilling is undertaken it seems best to locate some tests on the lower slopes of the hills in hopes that water might be found in the ^{above,} upper broken part of the bed rock. As explained however, this is a hope rather than a ^{certainty} forecast for it is apparent from photo ^{surface} that all ^{near the surface of} crevices and openings ~~in~~ the bed rock are probably filled with clay. Furthermore, the supplying watershed would be in any place very small and the ^{just} ~~underground~~ storage of water also limited. It is remotely possible that the sandstones north of the city, which do not form distinct hogback ridges, are looser and more porous than those which underlie the city. ^(see section) It is more probable, however, that this failure to show in the landscape is due to ^(a) ~~the~~ fine grain ^(b) and large amount of shale in these formations. ^{and (c) discontinuity of} No ^{formation} ~~formation~~ data could be found which bears upon this question. ^{and} It is certain that

no accurate idea of the underground geology can be obtained without drilling. ^{Still further north the Pottsville sandstone is quite soft and coarse-grained but} The use of surface water ^{from a reservoir on one of the streams naturally} suggests itself, but the writer is convinced that the expense of constructing a proper treatment plant for rendering such water safe for drinking is too great to saddle upon such a small community. The difficulty ^{and expense} of getting an experienced man to operate such a plant also makes its use unwise. If not

Surface water

^{contains many shale partings}
^{To the south of Boaz a formation which contains gravel is shown on the geological map.}
^{Its potential possibilities are unknown.}

properly operated such a plant is useless and leads to a false sense of security. Another possible source is springs but the writer could learn

of none within many miles of the city along the Pottsville escarpment to the

north. ~~and~~ These are all reported to yield water which is very high in iron.

Study of the map indicates that adequate watersheds to supply water to the

Pottsville (which is a ~~coarse~~ coarse soft sandstone which many shale partings)

are lacking within fully ~~10~~ ^{at least 8} miles north of the city. If it were necessary

to go that far it would be better to go south to a well in the gravels ~~along~~

Ohio River. The writer realizes that pipelines from ~~such~~ such distant sources

are not economically feasible unless a large part of their cost were

financed as a relief project. He ventures to suggest that ~~such~~ intercity

pipe lines radiating from good ~~and~~ adequate water supplies would answer the

question of satisfactory water supply in many sections of southern Illinois

could the cost be distributed over enough communities to render it tolerable.

Conclusions. ~~The following~~ In the light of existing knowledge the

following conclusions are arrived at by the writer:

(1) It is impossible for the contractor to complete two 60 g.p.m. fresh water wells in the city of Vienna.

(2) It is improbable that even a 25 g.p. m. well could be completed in or close to the built-up portion of the city without a long and expensive program of test drilling.

(3) If found, underground water will be ~~very~~ hard and contain considerable iron which will make trouble in the distribution system. *It will also require chlorination to make it safe for drinking if secured in the city.*

(4) Supplies from either (a) the larger areas of Pottsville sandstone to the north or (b) ~~from~~ ^{wells or springs in} the gravels of Ohio River to the south

would be far too costly for a small community unless a large portion of the pipeline were paid for as a relief project ~~and even if~~ *even if they were the case operation would still be costly expensive*

(5) Use of surface water is inadvisable ~~where a competent~~ *in a small city and is expensive* operator is difficult to obtain and such water would be very expensive if fully purified.

Spring
clear
the map

several miles
and would require treatment
called cave creek.
Such water would be unsafe and variable in amount

just south of Boonville
no investigation of these gravels was made

either
at the they could supply a number of towns

of construction of operation
in this region, however towns are far apart

DEPARTMENT OF
REGISTRATION AND EDUCATION
JOHN J. HALLIHAN, DIRECTOR
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STATE OF ILLINOIS
STATE GEOLOGICAL SURVEY DIVISION

M. M. LEIGHTON, CHIEF
305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

December 4, 1934

Mr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

In accordance with your letter received this morning, I am sending inclosed the log of the well at the Vienna Court House. I have marked thereon in pencil the probable correlations. Samples from this well were studied to make this log but they were not saved. Kindly return the log to us when you are finished with it.

Very truly yours,

P. E. Workman
P. E.

Associate Geologist
Subsurface Division

Incl.