WRD Exp. (GW)
April 1966

Well No. 078-14W-06 cccc

WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

MASTER CARD

Record by D. AARONSON Source of data FILE Date 1/19/67 Map 1:63,360 COUNTY HWY.

State IOWA [16] County (or town) POWESHIEK [79]

Latitude: 41 34 54 N Longitude: 092 31 30 Sequential number: 1

Lat-long accuracy: 2 T 78 N S, R 14 W E, Sec 6, SWSW ¼, SW ¼, SW ¼ 5

Local well number: 078 14W 06 CCCC Other number: B & M W-0357

Local use: 00357 36CITYT 4 Owner or name: MONTEZUMA TEST #4

Owner or name: MONTEZUMA IOWA Address: MONTEZUMA, IA.

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist — M

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Irr, (I) Med, (M) Ind, (N) P S, (P) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (Z) Other — U

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed. — T

DATA AVAILABLE: Well data 3 Freq. W/L meas.: INVENTORY Ø Field aquifer char.

Hyd. lab. data:

Qual. water data; type: COMPLETE — C

Freq. sampling: INTERMITTENT (I) — I Pumpage inventory: yes / no, period:

Aperture cards: yes

Log data: GEOLOGIST LOG — G

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 405 ft 405 Meas. rept DRILLER'S LOG accuracy 3

Depth cased: (first perf.) 220 ft 220 Casing type: STEEL ; Diam. 12 in 12

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (Ø) open end, (P) perf., (S) screen, (T) sd. pt., (W) shored, (X) open hole, (Z) other — X

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (Z) other

Date Drilled: 1936 9 3 6 Pump intake setting: ft

Driller: THORPE WELL CO. (name), DES MOINES, IA. (address)

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple, (cent.), (M) multiple, (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (Z) other — T Deep / Shallow — D

Power (type): diesel, (elec), nat gas, gasoline, hand, LP gas, wind; H.P. — Trans. or meter no. 5

Descrip. MP LSD ft above below LSD, Alt. MP 941

Alt. LSD: 941 941 Accuracy: (source) ALTIMETER — 7

Water Level 130 ft above (below) MP; Ft above (below) LSD 130 Accuracy: DRILLER'S LOG — D

Date meas: 1936 3 6 Yield: 142 gpm 142 Method determined

Drawdown: 50 ft 50 Accuracy: Pumping period 3 hrs

QUALITY OF WATER DATA: Iron 0.6 ppm 4 Sulfate 1160 ppm 9 Chloride 7.0 ppm 0 Hard. 1250 ppm 9

Sp. Conduct K x 10^6 Temp. 53 °F 53 Date sampled APR. 5, 1937 4 3 7

Taste, color, etc.

Punched ERC Verified FCH

Well No. 078-14W-06 cccc

Well No. 078-14W-06 CCCC

Latitude-longitude 41 d 34 m 54 s (N) S 092 d 31 m 30.1 s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD [1–19]

Physiographic Province: CENTRAL LOWLAND [20–21] Section: DISSECTED

TILL PLAIN [22] E

Drainage Basin: SKUNK [23–25] 25C Subbasin: [26]

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, swamp, (Φ) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat — UPLAND [27] F

MAJOR AQUIFER: MISSISSIPPIAN system, LOWER series [28–29] M1 KEOKUK-BURL. aquifer, formation, group [30–31] ØX

Lithology: CHERTY DOL. [32–33] QD Origin: MARINE [34] 6 Aquifer Thickness: 104 ft

[35–37] 104 Length of well open to: 104 ft [38–40] 104 Depth to top of: 228 ft [41–43] 228

MINOR AQUIFER: MISSISSIPPIAN system, LOWER series [44–45] M1 HAMPTON FM aquifer, formation, group [46–47] KH

Lithology: CHERTY DOL. [48–49] QD Origin: MARINE [50] 6 Aquifer Thickness: 55 ft

[51–53] 55 Length of well open to: 55 ft [54–56] 55 Depth to top of: 322 ft [57–59] 322

Intervals Screened: NONE

Depth to consolidated rock: 105 ft [60–63] 195 Source of data: WELL CUTTINGS [64] C

Depth to basement: ft [65–68] Source of data: [69]

Surficial material: [70–71] Infiltration characteristics: POOR [72] 4

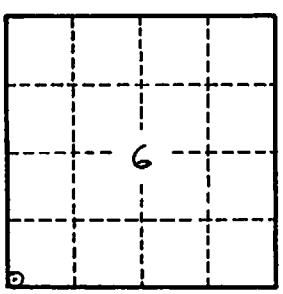
Coefficient Trans: gpd/ft [73–75] Coefficient Storage: [76–78]

Coefficient Perm: gpd/ft^2; Spec cap: gpm/ft; Number of geologic cards: [79]

CASING:

154' OF 20" PIPE 0-154'.

220' OF 12" PIPE 0-220'



Well No. 078-14W-06 CCCC

GPO 857-700

Pump Test of Montezuma Test hole No 4 Jan. 2-3, 1936

Time	No. Strokes per min.	Stroke in inches	Depth of Cyl.	Bottom of drop pipe	Static Level	Draw-down	G.P.M.	Condition of Water	Remarks
11:00 pm	31	30	191' 6"	209' 6"	138'	?	23.8	Rusty-clearing in 15 min. Small amt. scale	
11:30	31	30	191' 6"	209' 6"	?	?	23.8	Turbid	
12:00	31	30	191' 6"	209' 6"	?	?	23.8	"	Sandy (247-270)
12:30 AM	31	30	191' 6"	209' 6"	?		23.8	"	Clearing slightly
1:00	31	30	191' 6"	209' 6"	?		23.8	"	" "
1:30	31	30	191' 6"	209' 6"	?		23.8	Clearing	
2:00	31	30	191' 6"	209' 6"			23.8	"	
2:30	31	30	191' 6"	209' 6"			23.8	"	
3:00	31	30	191' 6"	209' 6"			23.8	Buff colored-rusty	Sandy
3:30	31	30	191' 6"	209' 6"			23.8	Clearing	
4:00	31	30	191' 6"	209' 6"			23.8	"	
4:30	31	30	191' 6"	209' 6"			23.8	"	
5:00	31	30	191' 6"	209' 6"			23.8	"	
5:30	31	30	191' 6"	209' 6"			23.8	"	
6:00	31	30	191' 6"	209' 6"			23.8	"	
6:30	31	30	191' 6"	209' 6"			23.8	"	
7:00	31	30	191' 6"	209' 6"			23.8	"	
7:30	31	30	191' 6"	209' 6"			23.8	"	
8:00	31	30	191' 6"	209' 6"			23.8	"	
8:30	31	30	191' 6"	209' 6"			23.8	"	
9:00	31	30	191' 6"	209' 6"			23.8	"	
9:30	31	30	191' 6"	209' 6"			23.8	"	
10:00	31	30	191' 6"	209' 6"			23.8	"	Water sampled
10:30	31	30	191' 6"	209' 6"			23.8	"	at 10:30 AM
11:00 AM	31	30	191' 6"	209' 6"			23.8	"	

Pump test of Montezuma test hole No 4 Jan 3-4, 1936

Time	No Strokes per min	Stroke in inches	Depth of Cylinder	Bottom of drop pipe	Static level	draw down	G.P.M.	Condition of water	Remarks
10:15 pm	42	30	167'11"	185'11"	185'11"	47'11"	33.2	clear	56.6 gal. -1'42" sucking air
10:30	36	"	"	"	185'11"	47'11"	28.3	clear	" " 2' " "
10:45	39	"	"	"	+<185'11"	->47'11"	29.2	Turbid - sandy	" " 1'56" just " "
11:15	45	"	"	"	+<185'11"	>47'11"	33.4	" "	" " 1'41" " " "
11:25	46	"	"	"	+<185'11"	>47'11"	34.3	" "	" " 1'39" not sucking air
11:30	48	"	"	"	<185'11"	>47'11"	42.4	" "	" " 1'20" " " "
12:30 AM	43	"	"	"	<185'11"	>47'11"	33.9	" "	" " 1'40" " " "
1:00	43	"	"	"	<185'11"	>47'11"	33.9	Turbid	" " 1'40" " " "
1:30	43	"	"	"	<185'11"	>47'11"	33.9	"	" " 1'40 " " "
2:00	44	"	"	"	<185'11"	>47'11"	34.5	"	" " 1'38" " " "
2:30	45	"	"	"	<185'11"	>47'11"	33.9	"	" " 1'40" " " "
3:00 AM	48	"	"	"	185'11"	47'11"	43.5	"	" " 1'18" sucking air

No Sample of water taken during this test.

Water temperature at 1:30 A.M. 52° F. at barrel @ 50' from pump.
Air " " " " 23° F.

G. A. Talley

Montezuma City Well #4

Pump —

24	7
23	5
23	6
23	0
24	6
22	2
24	4
24	8
24	10
8	10
6	6 cyl.
21	4 drop pipe
246	68
	58
251'	8" pump pipe
	2 above curb
249'	8" depth of bottom of drop pipe

249 8 pipe in hole
21 4 drop pipe
228' 4" depth to cyl.

Static level 128' S.C.
Inside diam. of cyl. 7½
251' 3" air line in hole

Casing record:
20" C.I. pipe 0 to 157'
16" 139' to 206' 6"
12" 0' to 220'
12" open hole 220' to 280'

Pumping Test at Montezuma City Well #4 March 14, 1936 at 280' depth

Time	No. Strokes per min.	Length of Stroke	Bottom of drop pipe	Depth to Cyl.	Static level	Air line Reading	Draw-down	G.P.M.	Condition of Water	Remarks
5:00 P.M.	28	34	249'8"	228'4"	128	50		135.8	Gray - Silty	56.6 g. 25"
5:10	29	34	249'8"	228'4"		22.		125.8	" "	56.6 g 27"
525	pump began to suck air; Sample taken just before shut-down, on order of Mayor and Chairman of Water Committee. All the Talking that Talley could do was to no avail.									

270' Static 138'
12" hole -

210'

245'

138'

Montezuma

31/1/36

Test No. 4.

Surface at 941'

	No Samples.	30'
-30	Drift - ylw - bf.	30'
-60	Sand - med gr.	2'
-62	Drift - ylw.	28'
-90		
	Drift - gray	35'
-125	Sand - med. fine silty	25'
-150	Drift, gray. unleach.	35'
-185		
	LS - gray - soft	60'
-245	SS - med-fine grnd. angl.	17'
-262	LS - gry	3'
-266	SS -	4'
-284	LS - gry - oolitic - cherty.	16'
-285	chert & LS - oolitic	5'
-290		
	Dolomite gry - med xline - porous crinoids - glauconitic cherty.	100'
-390	SLS - gry - calc.	13'
-403		
-405	SH - gry - grn	2'

Republican
Montezuma, Ia.
MAR 26 1936

CITY WELL TESTS 226 GALLONS PER MINUTE

Larger Quantity Than Was Supposed Existed.

State Made Tests Monday; Chemical Analsyis Report Soon; Water Safe for Drinking.

Tests under Geologist Tally from the state water department and state geological department on Monday proved that the new city well for Montezuma has water in a quantity not dreamed of by the fondest hopes of the city council. The well has a capacity of 226 gallons per minute and so tested. This amount was pumped out over a 30 minute period. It is thought that the pump to be purchased will have a capacity of 154 feet. From there to 220 feet system supplies about 25 gallons per minute.

The well is 395 feet deep with a 20 inch hole down to the depth of 154 feet. From there to 220 feet the width is reduced to 16 inches. Inside the hole a 12 inch iron pipe has been set in cement. It took 114 sacks of cement to complete the work. This all goes down to a depth of 220 feet. Rock is found at 185 feet, so all water comes through the rock or iron pipe.

The water stands at the present time 129 feet and six inches from the top of the ground. Over a period of 24 hours steady pumping the level of the water was not lowered to any appreciable extent. Over 200,000 gallons of water was pumped out during the test and permitted to flow away.

While the water has not been completely analyzed by the state department, it has ben proved to be of drinking quality and has been so certified. The complete chemical analysis will be sent here within a week or so. It is stated that little iron content has been found.

The bonds for the project have all been sold and the retirement of same must come from the water revenue. No additional taxes can be levied to pay for the system. It is so stated on the bonds, issued in the sum of $7,000.00.

The new pump when purchased will materially cut down the cost of water. Whereas now a barrel of oil is used every three months, only two gallons will be consumed. The new pump runs in oil and will take little or no care. Lane Cowell at the present time spends about a half day every day looking after the pump. Just enough time to turn on the switch will be the job when the new pump is installed. He will be able to devote his time to other city projects.

MEMORANDUM

To: H. G. Hershey
From: K. E. Anderson
Re: Montezuma water supply

Mr. K. S. Krause, of the State Health Department, stopped in to ask for information connerning possibilities of the City of Montezuma obtaining a better quality of water for their use.

He stated that there was no immediate rush as to this information, but would like it sent to him as soon as convenient. His address is Washington, Iowa.

In September, 1935, a report on water supply possibilities for Montezuma was prepared by A. C. Tester which is attached. Apparently the city first thought of drilling a deep well to the St. Peter in hopes of obtaining a good quality of water such as is gotten at Grinnell from that acquifer. It developed, however, that after test drilling, they decided to stop at the Mississippian and at present are obtaining their water from those horizons.

According to Mr. Krause, they now have a plentiful supply of water, but it is very hard and extremely high in magnesium and sulfate content. An analysis of the water after completion of their well is also attached.

Now the city is wondering about how to develop a water supply which will furnish them with a better quality of water. Apparently they have now paid for their present water works and are eager to go ahead as soon as possible with improvements--with the money in sight.

They are utilizing a spring near the town for part of their supply at present, but it is inadequate for their total needs. Mr. Krause says, however, that unless further improvements are made soon on their spring, they will have to discontinue it since it does not meet sanitation requirements.

The city should have a copy of the report of Dr. Tester's, and it seems to be a rather comprehensive one. In view of this fact, I can't exactly see why they are now asking for further data.

K.E.A.

9/30/41

ADVANCE REPORT ON TEST WELL NO. 4, MONTEZUMA, IOWA

Introduction

Test well No. 4 was started in December, 1935, to test the possibilities of water at a location suggested by the Iowa Geological Survey and approved by the Iowa State Board of Health. This well is located on the south side of Cass Street about midway in the block between Second and Third Streets. The well was drilled by Thorpe Well Company, of Des Moines. Careful samples were obtained for most of the section below 30 feet to a total drilled depth of 405 feet. The curb elevation at this well is 941 feet which is one foot below the curb of test well No. 3 and seven feet below the C.R.I. & P. railroad station track level. Pumping tests were run on completion of the well and observed by Mr. G. A. Talley, a representative of the Iowa Geological Survey.

Geology

The formations encountered in test well No. 4 show a close comparison with the formations in test well No. 3. In particular for that part below 281 feet in No. 3 from which samples were taken during the time that drilling was done in June 1935.

The generalized section in No. 4 is as follows:

Surface	Thickness (Given in Feet)	From	To
1. Soil, yellow clay and gumbotil (no samples	30	0	30
2. Drift, yellow, buff	30	30	60
3. Sand, medium-grained, mixed with some fine silt	2	60	62

	Thickness	From	To	
4. Drift, yellow with normal mixture of clay and glacial pebbles and sand	28	62	90	
5. Drift, light to dark gray, unleached and unoxidized, containing pebbles and sand	35	90	125	
6. Sand, medium to fine-grained with silty mixture	25	125	150	
7. Drift, medium gray color, unleached and unoxidized, some sand and gravel	35	150	185	
8. (Base of glacial drift 185')				
MISSISSIPPIAN				
8. Limestone, light gray, containing some buff dolomitic beds, all more or less fine crystalline texture, friable and porous	40	185	225	
9. Limestone, light gray, dolomitic, containing more or less chert and some zones of dolomite	20	225	245	
10. Sandstone, medium to fine-grained, angular, sharp grains	17	245	262	
11. Limestone, dolomitic, light gray, cherty	3	262	265	
12. Sandstone, medium to coarse-grained	4	265	269	
13. Limestone, light gray, dolomitic, fine crystalline texture, contains considerable chert	16	269	285	
14. Chert, white and light gray, oolitic structure with thin streaks of limestone	5	285	290	
15. Dolomite, light gray to buff color, granular, porous structure with thin silty zones in upper portion and becoming cherty in the middle portion. Contains typical fossils of the formation and numerous fracture zones and cavities	100	290	390	
(Hampton formation)				
16. Sandstone, light gray, calcareous, cherty, cemented	13	390	403	
17. Shale, greyish green, calcareous, compact	2	403	405	T.D.
Maple Mill member of Kinderhook.				

By comparison it will be noted that the shale encountered in No. 3 at 408 feet below the curb and 554 feet below sea level was likewise encountered in No. 4 at 403 feet below curb or 538 feet above sea level or 4 feet higher than in No. 3. The rock

formations through the producing zone are practically identical varying only in minor details. The composition of the rock is such that little variation in the quality of water could be expected.

Tests

Test ??

Two pumping tests were made on No. 4 well. The first test was started at 11:00 p.m. on January 2 and continued until 11:00 a.m. January 3, a period of 12 hours, during which actual pumping was continuous and produced at an estimated rate of 25.8 gallons per minute. During this test the 2½" I.D. pump cylinder was set at a depth of 131'6" below the curb and the bottom of the tail piece at 209'6" below the curb. At the beginning of the test the static level stood at 138 feet below the curb. At no time during the pumping test did the pump suck air. The water cleared after approximately 5 hours of pumping. This pumping test was not considered adequate in that it did not give an accurate measure of capacity actually pumped or did it supply information on the amount of drawdown.

A second pumping test was started on January 3 at 10:15 p.m. and continued until 3:00 a.m. of January 4 or a period of 4 hours and 45 minutes. At this time the 2½" I.D. cylinder was set at 167'11" below the curb with the bottom of the tail piece at 185'11". At the start of the pumping test the water level stood at 138' below curb. The length of the stroke was maintained at 30", the same as in the first test, but the strokes per minute were varied between 36 and 40. The response to the change of rate of strokes per minute was shown by the water production. The

maximum quantity of water produced was obtained with the set-up at 48 strokes per minute, yielding 42.4 and 43.5 g.p.m. for two fifteen-minute intervals. At the capacity of 42.4 g.p.m. the pump did not suck air, but at 43.5 g.p.m. a slight mixture of air was noted. After the first half hour of pumping the water became sandy and turbid and did not clear during this test. This would suggest that the drilling mud and loose materials of the formation were being pumped out and that additional development might increase the water flow.

It is assumed from the second pumping test that the drawdown occurred rather rapidly during the period of maximum pumping. Based on the figures at hand, the test well is rated at a 50 gallon per minute capacity with 55 feet of drawdown below the static level at 138 feet.

It is believed that the quantity of water at the site of test well No. 4 is sufficient and that a larger well properly constructed and developed will produce on test 50 to 100% more water, depending upon the diameter of the hole and the method of development.

Quality of Water

It has not been possible to obtain a final analysis showing all of the chemical compounds as reported in the results of test well No. 3. However, the incomplete and preliminary tests show that the water produced from test well No. 4 during the first period of pumping, sampled at 10:30 a.m. January 3, 1938, is of a quality practically the same as the

sample No. 86731 taken from test well No. 3 during the pumping test of July 8, 1935. There is a slight improvement in the sulphate content which it is believed is the result of the water being produced in test well No. 4 from the sandstone zone between 245 and 252 feet.

The decision rests with the city as to whether they desire to complete the final well to produce the quality of water as reported in the analyses mentioned above. If the city will be content with this quality of water, then the construction of the final well should be started. There is no opportunity to obtain a better quality of water within the depths tested in this locality. As recommended in the first report, the only chance for Montezuma to obtain a good quality of water is to develop the St. Peter sandstone at a depth of approximately 1650 feet.

Construction of Final Well

Two methods may be followed in the drilling of the final well. One method would be the enlargement of the present test hole to take a 12" diameter cast iron pipe, which should be set at a depth of at least 210 feet which will carry it into the solid limestone well below the fractured and porous upper portion of the limestone below the glacial drift.

The second method would be to move the rig and start a new hole of the desired dimension and set the pipe at the same depth to meet the same conditions mentioned above. In case the second method is followed, that is, a new hold drilled,

then it is absolutely necessary that the old test hole be solidly plugged to prevent contamination by water entering the well from surface and near surface sources. This would require the introducing of sand and gravel in the bottom of the hole up to 275 feet below the surface; the setting of a cement plug between 260 and 275 feet below the surface; filling with sand and gravel from 260 feet up to 200 feet; the setting of a cement plug between 180 and 200 feet; and then the filling with clay from 180 feet to the surface.

Provided the work is done properly in sealing the test well there is no objection to starting a new hole. If the contractor desires to use the old hole and prefers to accept the hazards of enlarging the old hole and saving the cost of moving the rig, then such an arrangement will be satisfactory.

The above information is submitted to the mayor and city council, of Montezuma, and the Thorpe Well Company for their consideration and decision.

A. C. Tester,
Assistant State Geologist

January 13, 1936.

SPECIFICATIONS AND CONTRACT

FOR THE RECONSTRUCTION OF WATER SUPPLY PLANT IN

AND FOR THE TOWN OF MONTEZUMA, IOWA

1. LOCATION AND DESCRIPTION

The improvements covered by these specifications and contract consists of the drilling and casing of a deep well, the furnishing and installing a deep well turbine pump together with its electric motor properly connected with the switch board, connecting output of well with present water mains, building the necessary pump house, furnishing and laying approximately 300 feet of 6" cast iron water main and other necessary appurtenences in connection with the improved water supply system within the Town limits of Montezuma, Iowa, at site determined by the Owner.

It is the intention that the work be done complete in every detail for the amount of the bid, for the entire improvement, and for each spparate item if Owner elects to contract the items involved separately.

2. INVESTIGATION

Bidders must satisfy themselves by personal examination of the site and surrounding conditions, as the successful bidder must complete the work in a satisfactory manner for the amount named in his bid.

3. QUALIFICATION OF BIDDERS

No bids will be considered unless the bidder can show at least three successfully completed cast iron deep well jobs such as contemplated or of greater magnitude; and have adequate and suitable equipment to carry the work to successful completion. The bidder must fully satisfy the Owner as to the sufficiency of his equipment and experience.

4. LIABILITY OF CONTRACTOR

The contractor shall be liable for all damages that may arise to persons and property due to the carrying on of his work, and shall maintain such watchmen, barriers and red lights at night as will effectively prevent accidents, and also

be governed by all local haighway laws and ordinances that may affect this class of construction. The Contractor shall bear all loss or damage, from whatever cause arising, which may occur on the works or any portion of them, until the same are fully and finally completed and delivered to and accepted by the Owner, and if any such loss or damage occur before such final completion, delivery and acceptance, the Contractor shall immediately at his own expense repair, restore and re-execute the work so damaged so the whole work may be completed properly within the time limit, and must indemnify and save harmless the Town of Montezuma againstall claims and demands of parties whatsoever, for damages or compensation for injuries arising from or caused by his operations.

5. SUPERVISION

The Contractor shall give his personal attention to the work or employ a competent and reliable foreman, and as large a force of workmen as is necessary to prosecute the work with diligence. Any foreman or workman employed by the Contractor or his sub-contractor who, in the opinion of the Engineer, does not perform his work in a proper or skillful manner, or who becomes disorderly, intemperate or disrespectful shall, at the written request of the Engineer, be discharged from the work by the Contractor and shall not be re-employed onany part of the work without the written consent of the Engineer.

6. GENERAL

(a) When this well is completed as outlined above, and in accordance with plans for same which are hereto attached, it shall be straight and plumb enough so that a turbine or plunger type pump of the required capacity will function properly. The contractor will guarantee that the said well will furnish at least 125 GPM continuous pumping. If for any reason this well does not furnish the guaranteed amount of water the contractor will be obliged to drill deeper at his own cost and expense until said well will and does furnish the required 125 GPM continuous supply of water.

(b) The contractor will furnish a complete log of the hole which will show the depth of each formation, characteristics and samples of formation. These samples shall be taken at least every 10 feet and at each change of formation; also, samples of water shall be takne for each water bearing formation. These samples shall be taken by using a tight baler and making bailer tests on same.

(c) All this work shall be done under the direction of the Owner and the State Director of the Federal Emergency Administration of Public Works, or their duly authorized representatives and agents.

DEEP WELL

1. CAPACITY

The well is to have a minimum continuous yield of not less than 125 GPM (GALLONS PER MINUTE.)

2. SIZE AND DEPTH

(a) The well is to be drilled approximately 1675 feet deep from the surface of the ground at its location. The top section of the casing shall be 20" O.D. temporary pipe which is to be furnished by the contractor.

(b) After this pipe has been placed a 19" hole shall be drilled to a depth of at least 280 feet. At this depth it is expected the limestone will be hard enough to withstand the weight of a line of 12" Class 250 cast iron pipe.

(c) Below the 19" hole a 15" hole shall be drilled to a depth of approximately 550 feet. In this hole a 14" steel liner shall be set, with a Texas pattern forged tool steel drive shoe attached to top of same. This liner is placed with the intention of shutting out the Kinderhook shale, and to take in all of this formation.

(d) A 12½" hole shall be drilled below the 15" hole to a depth of approximately 1400 feet, or through the Maquoketa shale. In this hole an 11" I.D. liner, with a Texas pattern forged toolsteel drive shoe attached to the top end, shall be placed and the 11" hole drilled to about the bottom of the Galena Platteville or to a depth of approximately 1550 feet. Then two lengths of 8" steel pipe shall be centralized in said hole at a point where the formation is found solid enough to withstand the 8" line of threaded and coupled cast iron pipe.

(e) Below this point an 8" hole shall be drilled to the bottom of the St. Peter sandstone, a depth of approximately 1675 feet below surface of ground. On completion of the drilling of the 8" hole the 8" liner shall be removed. If it is then found necessary to increase the flow of water, the St. Peter sandstone shall be shot with four or five charges of sixty per cent nitro glycerine dynamite, properly placed.

(f) Upon the completion of cleaning the hole, the contractor will be required to bridge the 15" hole about 10 or 15 feet from the top of it. A line of 12" Class 250 cast iron pipe, properly threaded and coupled, with a forged tool steel drive shoe attached to the bottom end, shall be centrally placed in the bottom of the 19" hole, and this line of pipe shall be adjusted to true position and properly

cemented in said hole.

(g) After this line of12" cast iron pipe is placed and cemented the bridge shall be cleaned out to the top of the 8" hole. If the 8" hole is not filled in up to its top with œavings and cuttings it shall be bridged, while the 8" pipe is being placed and cemented. This line of 8" -Class 250 cast iron pipe shall be properly threaded and coupled and shall have a Texas pattern tool steel shoe attached to the bottom end. As this cast iron pipe is being placed it shall be comented for at least 50 feet at the bottom and between the outside of the pipe and the wall of the well to make a water tight joint. It might be necessary to place this 8" line of pipe in three or more sections. If this is the case slip joints shall be furnished by the contractor who shall have the cast iron pipe properly turned on the bottom end of each section that enters the slip joints.

(h) The contractor shall furnish and install lead packing washers properly made so as to fit under the bottom end of each slip joint making the joints water tight. The top end of this line of cast iron pipe shall be fitted with a lead seal attached to the forged tool steel shoe. This lead seal is to extend up inside of the 12" pipe not less than 6 feet, and shall be properly swaged out to insure a water tight joint.

(i) The contractor shall furnish a test pump having a capacity of not less than 200 GPM and on completion of the well a 12 hour pumping test shall be run by the contractor.

BIDDING BLANK
for

Drilling Deep Well

Town of Montezuma, Iowa

		Per foot (Unit Price)	Total
1.	For drilling hole large enough for 20" pipe, furnishing temporary 20" pipe and driving same to approximately 215'	_____	_____
2.	For drilling 19" hole from approximately 215' to approximately 280'	_____	_____
3.	For drilling 15" hole from approximately 280' to approximately 550'	_____	_____
4.	For furnishing and setting approximately 200' of 14" liner through the Kinderhook shale	_____	_____
5.	For drilling 13½" hole from approximately 550' to approximately 1350'	_____	_____
6.	For furnishing and setting approximately 180' of 12" liner through the Maquoketa shale	_____	_____
7.	For drilling 12" hole from approximately 1350' to 1550'	_____	_____
8.	For furnishing approximately 280' of 12" cast iron pipe	_____	_____
9.	For installing 280' of 12" cast iron pipe and cementing same	_____	_____
10.	For furnishing approximately 1300' of 8" cast iron pipe	_____	_____
11.	For installing 1300' of 8" cast iron pipe and cementing bottom end	_____	_____
12.	For drilling 8" hole from approximately 1550' to 1675'	_____	_____
13.	For furnishing one 20" Texas pattern forged tool steel drive shoe	_____	_____
14.	For furnishing one 14" Texas pattern forged tool steel drive shoe	_____	_____
15.	For furnishing one 14" Texas pattern forged tool steel entering shoe	_____	_____
16.	For furnishing one 12" Texas pattern forged tool steel drive shoe	_____	_____
17.	For furnishing one 12" Texas pattern forged tool steel entering shoe	_____	_____

		Per Foot	Total
18.	For furnishing one special 12" Texas pattern forged tool steel drive shoe for cast iron pipe	_____	_____
19.	For furnishing one special 8" Texas pattern forged tool steel drive shoe for cast iron pipe	_____	_____
20.	For furnishing one special 8" Texas pattern forged tool steel entering shoe for cast iron pipe	_____	_____
21.	For furnishing and installing lead packer between 8" and 12" cast iron pipe	_____	_____
22.	For furnishing and cleaning out hole if necessary to develop	_____	_____
23.	For furnishing tubbine test pump capable of pumping 200 GPM	_____	_____
24.	For installing pump, making pumping test and taking out pump, price per hour	_____	_____
25.	For installing pump, making pumping test and taking out pump if necessary to make a second pumping test on said well, price per hour	_____	_____

Total price of Bid on Well _____

This proposal is submitted this _____ day of _____

A.D., 1935, by

_____
Contractor

By_____ _____

Address _____

PUMP & MOTOR

One deep well turbine pump to have a capacity of 125 gallons per minute against a total head of 400 feet of which 280 feet is pumping head in the well and 120 feet is head above the well into elevated tank.

Bidder to submit guaranteed performance curves showing guaranteed water-to-water efficiency (taking into account all column friction losses and shafting transmission losses): also to show guaranteed overall efficiency; also to show guaranteed kilowat hours required to lift 1,000 gallons of water against 400 foot head. Consideration will also be given to average efficiency over a range of from 100 to 140 gallons per minute.

Speed of pump must not exceed 1760 RPM

Column pipe shall be in standard 10-foot sections and shall be of standard full weight copper bearing pipe.

In case of oil lubricated pump, shaft enclosing tubing shall be extra heavy pipe in standard 5-foot lengths.

Shafting shall be Cumberland turned, ground, and polished shafting or equal; and in case pump is water lubricated, there shall be a reasonable stainless steel wearing sleeve at all points where shafting passes thru rubber bearing.

Pump head shall be of the standard hollow-shaft direct-connected type, and preference will be given to heads so constructed as to permit of self alighment between pump and well.

Pump impellers may be of either bronze or cast iron with vitreous porcelain lining, and preference will be given to vitreous porcelain lined pump cases.

Motor shall be 220-volt, 3 phase, 60-cycle, 1760-RPM hollow-shaft vertical. Each bidder will be required to state the HP of motor he expects to furnish.

Top of pump bowls shall be at least 230 feet from surface of the ground, and there shall be 10 feet of standard full weight copper bearing suction pipe below the bowls.

ZIMMER BROTHERS CO.
309 - SIXTEENTH STREET
MOLINE, ILLINOIS

April
19 th
19 37

Dr . A.C.Tester,
Iowa City,Iowa.

Dear Sir:

The pump furnished to the City of Montezuma wasinstalled the first week in June 1936 and it is an AMERICAN 8" 14-stage pump designed to deliver 150 GPM against a total dynamic head of 340' while operating at 1750 RPM. The pump proper consists of bronzebowls, bronze impellers mounted on a stainless steel shafting, and it is complete with twenty 10' lengths of 5" ID full full weight Genuine Wrought Iron discharge column arranged for oil lubrication, with turned, ground and polished steel line shafting. It is further complete with a 10' length of Genuine Wrought Iron suction pipe with a 5" bronze strainer. At the time the pump was purchased part of the council were reluctant to spend the additional amount of money necessary for stainless steel shafting so this was not put in at that time.

I checked further into my files and I failed to find the informatinn covering the tests were run on the well but as I remember it and I believe I am not far wrong, that they pumped 162 GPM at the time the test was run with the water drawing down to within about 6' of the top of the turbine proper, or having a pumping level of 194'. I am sure this is cofrect and, if in the mean time I can be of any further service please do not hesitate to let us know.

I do not know whether you have had a copy of the paper that came out at that time but I am sending you one herewith for your files.

Very truly yours

ZIMMER BROS CO.

HZJF
enc

April 7, 1936

Mr. W. J. Heinz
Iowa Machinery & Supply Company
Des Moines, Iowa

Dear Mr. Heinz:

In reply to your letter of April 4, I am pleased to enclose herewith a copy of the final analysis showing the chemical composition of the total water supply as developed from the new well at Montezuma, Iowa. The sample of water was taken after twenty-three hours of pumping during which time a maximum production of 225 gallons per minute was obtained with a drawdown of 121 feet. The static level of the water at the start of the pumping test was 130 feet below curb and with a drawdown of 50 feet to a depth of 180 feet, a total of 121 gallons per minute was produced. With a lowering of the water level 55 feet to 185 feet below the curb, 135 gallons per minute was developed. Pumping at the rate of 178 gallons per minute, the drawdown of 72 feet lowered the water to 202 feet below the curb.

In my recommendation to the Council at Montezuma, I suggested that the maximum depth of the pump setting be considered to be the 185 feet below curb, as such a level should produce at least 125 gallons per minute over a long period of time. In the future there will probably be repairs necessary to the pumping equipment or some replacements, and at that time a lower setting of the pump can be obtained if needed.

Do not hesitate to call on us if we can be of service to you in any other project in the state. We are desirous of cooperating with all those concerned in water supply development and to obtain new information, to learn new facts, as well as to assist with what data we have available.

Yours very truly,

A. C. Tester

ACT:A
Enc. 1

Iowa Machinery AND Supply Co.

E. K. STODDARD
GENERAL MANAGER

315-317 WEST COURT AVENUE

TELEPHONE 3-6174

DES MOINES, IOWA

April 4, 1936

Mr. A. C. Tester
c/o State Geological Dept.
Iowa City, Iowa

AIR COMPRESSORS
BELTING
BOILER ROOM SUPPLIES
BOLTS
CONTRACTORS' TOOLS AND EQUIPMENT
ELECTRIC MOTORS, DRILLS, GRINDERS
ENGINEERS' TOOLS AND SUPPLIES
HOISTING EQUIPMENT
HOSE AIR, STEAM WATER
MACHINE SHOP TOOLS AND EQUIPMENT
MACHINE SHOP FOR GENERAL REPAIR WORK
PIPE, VALVES FITTINGS
PULLEYS AND SHEAVES
PUMPING MACHINERY
ROPE WIRE AND MANILLA
TRUCKS WAREHOUSE
WOODWORKING MACHINERY
TRANSMISSION EQUIPMENT
WATERWORKS MACHINERY AND SUPPLIES

Dear Sir:

As per our conversation yesterday I would appreciate it very much if you would send us a report of the analysis of the water which you are making for the City of Montezuma.

Thanking you in advance, I beg to remain,

Yours very truly,

IOWA MACHINERY AND SUPPLY CO.

W. J. Heinz

WJH NB

Form No. 18 10M 11-34

April 7, 1936

Mr. R. S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

Attached hereto you will find a final report on the quality of water developed by your new well as sampled after twenty-three hours pumping on March 24.

Comments on the quality of the water have been made at the bottom of the accompanying sheet. Also, you will find enclosed an analysis of the water developed when the final well was drilled to a depth of 280 feet, the sample being taken at the end of the fifteen-minute pumping test run on March 14. You will note that this water is of better quality than that encountered at the bottom of the hole.

I will send you a complete summary of all tests developed during the history of the project, so that you will have a complete record in your files, just as soon as I have time to summarize the information. The enclosed analyses, however, should serve your immediate purpose of determining the type of pump and the nature of metals to be used in the pump.

Yours very truly,

A. C. Tester

ACT:A
Enc. 2

March 26, 1936

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

No doubt Montezuma is pleased at the outcome of the pumping test on the new well. If the quality of water as developed during the pumping test will stay within the bounds of our preliminary test, then your troubles should be over.

I understand that you have raised several points concerning the analyses that we discussed at my last visit to Montezuma. I will make a full reply to your questions when we have all of the complete analyses in a final form for the various samples that have been submitted during the last two months. As you will recall, some of this material was in a preliminary form at the time of our discussion and also additional samples have been taken since my last visit. I hope to have all of these data within the next week. However, the fact remains that the water in the new well will run very high in sulphate and will be quite hard, but will be low in iron and sodium. The principal difficulty will be the magnesium sulphate and calcium sulphate. In the purchase of pumping equipment, the manufacturers bidding on the job should be well acquainted with the chemical composition of the water. A porcelain lined bowl and discharge pipe should be used, as such surfacing appears to withstand the corrosive effect of sulphate waters.

You requested information about the depth of setting of the pump. The results of the pumping test early this week give conclusive

information for this determination, and certainly there is no need for extra expenditure for drop pipe and shaft, as the pumping information is accurate. Below are tabulated measurements which can be used for drawing up specifications for the pump.

Static level at start of pumping test, 130 ft. below curb. This level will be greater when the pump house is built, as the pump will be installed several feet above the curb.

Water Level Below Curb	Pumping at g.p.m.	
175'	117	
180'	121	
185'	135	
191'	154	
202'	178	
207'	190	
251'	225	sucking air at this moment.

With the setting of the last level of intake on the bottom of the turbine bowls at 200 feet below the present curb of the well, an ample quantity of water in excess of 150 g.p.m. can be obtained. This is a maximum depth that the pump should set, as anything lower than this is a useless expenditure for equipment. In fact, I believe that a setting of 185 feet or a saving of 15 feet of drop pipe, pumping shaft, bearings, etc. which would yield 135 gallons g.p.m. is ample for the needs of Montezuma for years to come. In other words, conserve on the cost of pumping equipment and wait for development in the reaction of the water to the metals of the equipment.

I will send you a complete report of chemical composition as soon as these data are available.

Yours very truly,

A. C. Tester

ACT:A

357

Town has surface water reservoir as supply now 6/62

Name Montezuma test well No. 4

Loc. NW/c NW 7-78N-14W, Routt Co.

T.D. 403'

Drilled Thorpe Dec. 1935 - Jan. 1936

Log W-0357 E. Schultz, Harris, Carmody

Casing 154' of 20" pipe 0-154'; 220' of 12" pipe from 0-220'

Prod. Data

SWL 130'

PWL 180'

Yield 142 gpm

Check if used - STANDBY - DISCONNECTED - USED FOR WASHING STREETS 20HP TUR

Water analyses: No. 7646 (3737) 9/17/52; No. 101570 1/2/36; No. 102104 3/14/36 (Drlg. 280'); No. 102178 3/24/36; No. 111990 4/9/37; No. 101568 12/30/35; No. 101569 12/30/35; No. 101570 1/3/36

Also well No. 2 (280') No. 91785 12/22/34 CASED - NEVER USED

Also test No. 3 (413') No. 96731 7/2/35; No. 96240 6/21/35 (Drlg. at 281') Flows over

Elev. 941

Formation	Depth	Top	Base	Thick.
Spergen	188	753	741	12
Warsaw	200	741	713	28
Keok.	228	713	656	57
Burl.	285	656	619	37
Hampton	322	619	564	55
No. Hill	377	564	552	12
Pros. Hill	389	552		

403
220
183

March 16, 1936

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

I was somewhat surprised when Mr. Talley made his report to me concerning the "pumping test" which was run Saturday evening. It is to be regretted that no information was obtained from the pumping test. The procedure was very wasteful in that the heavy cost of running in the pumping equipment and then taking it out was without any use. There is certainly no information of value to any one on the fifteen minutes of pumping that was done.

You will recall that I was skeptical of the quantity of water to be obtained and expressed this doubt at the impromptu council meeting Friday night, but that I felt that you should test the formation. As it now stands, you spent the money and did not make a test, and there is no way of telling just how much water is available at the present level.

I am not criticizing the fact that you decided that there was insufficient water there or that you should drill the hole deeper, but I cannot see how or on what basis you know that there is insufficient water at that zone. It looks to me as though there was a pre-determined action which was to control regardless of the results of this so-called pumping test. That being the case, what was the use of spending the money for putting in the pipe?

I am asking these questions frankly and bluntly because of my interest in your project, and I certainly want it clearly understood that any part that I may have played in the recommendation of this expenditure certainly was with the idea that some results would be obtained and that such arbitrary action would not be taken. I will be interested to learn more of this situation.

Yours very truly,

A. C. Tester

ACT:A

206
19
17
10
57

February 14, 1936

Mr. R. S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

With reference to our telephone conversation this afternoon in which you explained the situation in connection with the construction of the new city well, I have the following suggestion to make.

Inasmuch as it is not possible to drive the 20" pipe below 157 feet and the glacial drift between that depth and 183 feet which is the top of the bedrock is caving badly, it is desirable that a liner be set to shut off the caving formation.

Your proposal that a 16" liner be set at 206 feet with sufficient overlap in the 20" pipe is satisfactory. I recommend, however, that a lead seal be placed between the 16" liner and the 20" pipe, so that a permanent seal will exist in that position. An overlap of about 12 to 15 feet should be sufficient. This necessitates, of course, that the 20" pipe be left in the hole as now constructed.

When the drilling is completed to the depth of 210 to 215 feet, then the 12" cast iron pipe should be set and cemented from that depth to the surface, filling the space between the cast iron pipe and the 16" pipe and the 20" pipe.

It is unfortunate that the 20" pipe became tight and it was not possible to drive it to the bedrock surface.

Yours very truly,

ACT:A

A. C. Tester

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

2/10/36.

Dr. A. C. Tester;
Iowa City-Iowa.

c/o State Geological Department.

Dear Doctor;

This will inform you as to the progress that has been made on the well at Montexuma Iowa.

The twelve inch casing has been set and the cement run in between the 12 and the outside 20-and the excess cement inside the 12 has been removed-when sufficient time has elapsed for the cement to harden-which will be at 12 midnight tonight-2/10/36-the will commence drilling in.

The deepening of this hole will be quite rapid from now on-and you perhaps will call to mind that there was a formation which as I recall it-at a point around 270 that you was going to check the samples again in the laboratory-and that you might suggest a liner be placed in this formation should it appear that it might not be solid enough to stand up-and may be a pump test at that point.

Your recoerds will more than likely bring this all back to your mind-so that you may follow us through-for it will move rapidly from now on.

Please let me hear from you as to any directions that you may see fit to make that they may be followed-it would appear that the 270 level would be reached in 48 hours as the 12 inch was set at 220.

Yours Respectfully.,

Roy S Alexander

Bussey, Iowa
Feb. 10, 1935

Dear Dr. Tester:

Arrived in Bussey at 11:15 Saturday morning, after being told at every stop that I couldn't get through. I found the rig shut down, so I prepared a report on the first 80 feet of drilling and mailed it Saturday night at 5:30. I learned this morning that the first mail out of Bussey left this morning at about 10:30.

The bed rock surface in the Montezuma well is at 183 feet. I have two samples in my car - 179-184', and 184-189'. The last four feet of drilling took from 6:00 o'clock until about 11:30. The situation seems to be the same in these samples as in the first set. Bed rock is overlain by very fine sand, which grinds the limestone so fine that it washes out of the samples. I have washed and unwashed samples of

Montezuma

for the interval from 184-189.

Drilling today on the Bussey well was going nicely. The hole is not caving, and the shales and silstones drill easily -

I hope it gets warmer quickly!

Yours truly

Gilbert Talley

February 5, 1396

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

Thank you for your note of February 3 informing me of the depth of the well at Montezuma. If the roads will permit it, I will make an attempt to get over some time Friday, and even though they may have completed drilling the interval below 150 feet to the bedrock, I will at least get the information I desire. I trust they are keeping complete records of this material.

Yours very truly,

A. C. Tester

ACT:A

The Palace Drug Store
Roy S. Alexander
Montezuma, Iowa
2/3/36;

Dr. A. C. Tester;
Iowa City---Ia.

Dear Doctor;

This will inform you-as agreed-that the new well is now down 150 feet and cased with 20" casing to that depth-they seem to be moving along very well-though some trouble was found getting the casing set at the start-

As you may call to mind-they will encounter the rock at 185 feet-so there is but a short distance to go-which will not require much time to do it.

Should there be any suggestions that come to your mind will be glad to hear concerning them- thank you.

Yours Respectfully.,

Roy S Alexander

January 14, 1936

Thorpe Well Company
2340 Sixth Avenue
Des Moines, Iowa

Att: Mr. George Thorpe

Gentlemen:

Enclosed find a copy of the advance report which I submitted to the council at Montezuma with relation to the test well No. 4. I met with the council yesterday afternoon and discussed this report. The council agreed that work should proceed at once on the development of the final well. The procedure will be to enlarge the test hole to 20" hole to take the 12" cast iron pipe set at a depth of at least 210 feet. I understand the contract calls for setting of 212 feet of pipe which, of course, will be satisfactory. It is further understood that the pipe will be set in cement which will be poured in such a way as to make a solid and complete ring of cement from the base of the pipe to the surface of the ground.

The water which is in the sandstone formation between 245 and 269 feet is of better quality than the lower water and should be saved. This formation should be developed in such a way as to increase its producing capacity to the maximum amount, and a careful test should be made when the large hole is drilled to that depth.

In the discussion with the council, it was suggested that the large hole should be run to at least 390 feet depth, which is the top of the siltstone member.

If there is any further information that you desire on the character of the beds encountered, do not hesitate to call on me. We will be glad to give you a more detailed descriptive log of the samples if you desire it.

Yours very truly,

A. C. Tester

ACT:A
Enc.
CC: Mr. R.S. Alexander

January 14, 1936

Mr. R. S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

The enclosed carbon copy of letter addressed to Thorpe Well Company is self-explanatory.

In the last discussion just before the close of the council meeting you will recall that you raised the question of the depth of the large hole. I answered that drilling to the top of the siltstone at 390 feet depth would be sufficient. On checking the report, I find that this member is described as a sandstone. Please correct the copies of the report that I submitted to you so as to change in bed No. 16 the word "sandstone" to read "siltstone". There is considerable difference in the interpretation of these two formations as water bearers or as a seal against water percolation.

I presume the method to be used by Thorpe Well Company will be the drilling of a 20" hole to 212 feet with temporary pipe set at that depth. From that point the hole will probably be tapered to form a shoulder for the setting of the 12" cast iron pipe, and it is possible that they will set a temporary string of steel pipe to continue the drilling of an enlarged hole below 212 feet. When this enlarged hole has penetrated the sandstone formation between 245 and 269 feet, it will be necessary to make a test on the water capacity at this level. I believe that the hole at the small test hole will be sufficiently plugged below this depth to hold out the lower water. In this way it will be possible to determine the exact quantity of the higher quality of water obtained in this well. This may lead to special efforts to increase the flow by applying the proper methods of development.

I will be pleased to hear from you regularly during the operation in the final well , and especially I wish to know when the depth of 150 feet is reached as I wish to make special observations during the drilling below that depth and above 185 feet.

As you know, I am intensely interested in this project and especially hopeful that the new well will be a successful venture. I appreciate the way in which you and the other members of the council have cooperated in making my efforts useful.

Yours very truly,

A. C. Tester

ACT:A
Enc.

Republican
Montezuma, Ia.

DEC 5 1935

Start Well Drilling Operations Monday

Operations to find a new water supply for the town of Montezuma were gotten under way Monday when the well drilling apparatus was wheeled into position on the lot between the George T. Jackson and L. C. Miltenberger residences in south Montezuma. Twenty-four hour shifts will be maintained until the test hole is completed. Four drillers will split into shifts to keep the work constantly under way. Walter Saunders will serve as a helper.

It is planned to drill a test hole 415 feet deep, and if the quantity and quality is satisfactory to put down a permanent well at the same spot.

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

12/12/35;

Dr. A. C. Tester;
Iowa City-Iowa.,

Dear Doctor;

To inform you that the Thorpe Well Co's men are on the job with the test hole and are now down about 40 feet-and are taking the samples as you requested.

I promised to let you know about this-so that from now on you may be hearing from me in regard to it.

It would be mighty handy if I had some of those mailing sacks to take care of these samples instaed of the jars as I did before and thought that you might have a few extra on hand that you would like to send down for that purpose.

Commencing today at noon the rig will run full 24 hours a day so that they should make good time-and should have the test hole down in a very short time.

Will be pleased to follow any directions that you see fit to give-or have you call on your way by-the weather and roads permitting;

Yours Respectfully.,

Roy S Alexander

75-80 left with driller 12/14/35

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

11/16/33;

Dr. A. C. Tester;
Assistant State Geologist;
Iowa City--Iowa.

Dear Doctor;

Your kind inquiry relative to the Montezuma Iowa Water Works project received-and am pleased to state that a contract was made with the Thorpe Well Co., of Des Moines Ia., some time ago-

The machine that they will use here was tied up on a well at Ft. Dodge and I have a letter from George this morning in which he states that a car has been ordered for shipment of the Rig from there to Montezuma-and should reach here some time during this next week.

Under this contract I have arranged for the samples and such other information as you have suggested and they will attend to it in the manner that has been suggested.

Approval of the State Board of Health-by and under the direction of Mr. Fiala-who has made a personal survey of the location-has been received-and is on file with the City Clerk.

I have this morning notified Mr. P. F. Hopkins-that it is not possible to take advatage of the PWA grant-as under its restrictions it is incompatible with a well project of this character-and to cancel the Montezuma application.

I feel a deep obligation to you for your interest-and in as much as work has not commenced-would suggest that you delay a stop at Montezuma untill a later date-will keep you informed ,thanks.

RS Alexander

November 15, 1935

Mr. Roy E. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

Not having heard from you for some time, I am inquisitive about the progress that you are making on your water supply project. Have you let the contract for your new well?

I plan to be in Des Moines and western Iowa the latter part of next week and can arrange to stop and see you if there is anything that you would like to discuss with me.

Yours very truly,

A. C. Tester

ACT:A

October 16, 1935

Mr. George E. Thorpe
Thorpe Well Company
2340 Sixth Avenue
Des Moines, Iowa

Dear George:

Thank you for your letter of October 15 with reference to the situation at Montezuma. Enroute to central Iowa the first of the week I stopped at Montezuma for a few moments and discussed the outcome of the council meeting with Mr. Alexander. I am very much disappointed that the town does not find it possible to drill to the St. Peter sandstone. Of course, we recognize that there is always a hazard in drilling a deep well, and formations are not always as we expect them. On the other hand, the chances of error in this particular case are relatively small, and I wish that all of the propositions were as favorable as this one. However, that is their decision, and there is nothing that we can do about it. My only regret is that they are not taking advantage of an opportunity for a reasonably good water supply but instead will develop the poor water as encountered in the test hole south of town.

I appreciate very much your interest in keeping me informed on this proposition and the interest that you have in seeing that samples and other desirable information are furnished to the Geological Survey. We are in agreement that all of this information for the entire state will help the work of the well contractor and in the end pay dividends to him. It is our desire to utilize this material to the best advantage of the trade and thus enrich their opportunities.

Yours very truly,

ACT:A

A. C. Tester

THORPE WELL COMPANY

CONTRACTORS

LATEST ROTARY AND CABLE TOOL EQUIPMENT
THORPE PATENT GRAVEL PACKED WELLS

2340 SIXTH AVENUE
TELEPHONE 3-6107

DES MOINES, IOWA

PLEASE ADDRESS ALL REPLIES
DIRECT TO THE COMPANY

Oct. 15, 1935

A. C. Tester
Asst. State Geologist
Iowa City, Iowa

Dear Mr. Tester:

We appreciate your letter of September 30th. In regards to Montezuma: We will be glad to take samples every five feet, and any change of formation.

I met with the council of Montezuma the other day and they felt as tho they did not want to take a chance of drilling down into the St. Peter for fear they might get hard water. I have honestly felt as if they had better than a 50-50 chance of getting water about the same as at Grinnell but do not think they feel that way. I have felt as if they did not care to take the chance of going ahead. I told them that I thot a fair estimate would be around $9,000. This would include furnishing temporary line of pipe as well as permanent lines, but would not include the placing or furnishing the line of cast iron pipe and cementing same in place. I felt as tho this could be done after the test had been made on the water and that they would get a better grade of water.

I do appreciate your knowledge and expectations in regard to the different formations, and I feel as tho the contractor would have to stand what variation there is either way in the liners, and also felt that it would not be necessary to put in any permanent pipe until a satisfactory test had been made on the water.

If we are lax at any time in getting you the necessary samples would be glad if you would call our attention to it.

Respectfully yours

THORPE WELL COMPANY

By Geo E Thorpe.

G. E. THORPE

GET:LB

October 11, 1935

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

It was with considerable regret that I read your letter of October 7. It is to be regretted that you find it impossible to drill the deep well and develop the St. Peter water for Montezuma. I have given this subject additional study since our last talk and feel more certain than ever before that your chances for an excellent water supply from the St. Peter sandstone and in sufficient quantity to give you a fine reserve is available at Montezuma. Of course, I do not know what happened at your Council meeting nor do I know what difficulty you had in convincing the balance of the Council. If the proposition is not entirely closed or out of thequestion, I will be glad to do anything that you suggest to explain the matter more fully to those members that feel the St. Peter well is out of the question.

I am returning herewith the blue print showing your location for the proposed well to be drilled to the top of the Kinderhook shale. You marked the location between Second and Third Streets on Cass Street. So far as I know this location should be satisfactory, as it is south of the suggested area that I marked in orange. However, there may be some local conditions within this block that are not familiar to me. In addition to my statement, I suggest that you write to Mr. A. H. Wieters, State Board of Health, describe the situation to him, and ask that a sanitary engineer visit Montezuma and give his authorization to the location.

The Geological Survey will continue to serve you in any way that you may desire. In fact, I am

very much interested in your proposition, and regardless of your final decision I wish to keep in touch with the drilling program. Even though we have samples from the other well, we will wish samples from the new well--both test and final hole. Why do you think it necessary to drill a test well for this horizon?

Yours very truly,

A. C. Tester

ACT:A
Enc.

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

10/7/35.

Dr. A. C. Tester;
Iowa City;
Ia.

Dear Doctor;

Herewith you will find enclosed a blue print of the Town of Montezuma Ia., on which I have marked the new location of the proposed water supply of the town.

I made every effort to get a location as near as the marked suggested location as possible-but found that it was not possible to do it-but did make a deal whereby we are able to get possession of the lot as I have marked it in Red.

It is our intentions of first putting down a test hole to make sure-and if proven satisfactory will then set over and develope the well proper.

The Marsh Eng Co,. of Des Moines are taking care of the specifications-and while we will be compelled to go through the formality of asking for bids-it will not be by publication but by mail-for it is our intention of Thorpe Well Co doing the work.

Under these circumstances we will be able to get under motion much sooner-and presume that the test hole will be started within the next ten days.

It was my thought in sending you the map-that should you or your department care to be kept in the picture-that you might circle the second location-as approved- and in returning this blue print tell me just what you would like to do.

I have not made myself clear that it is the shallow water that we will have to be contented with-as it is not possable to finance a deep test-so will attempt to get the same water that we found on top the Kinderhook shale on the Morgan farm.

We are cancelling the Govt Grant of $5700 as its restrictions are such that it means only confusion and as I see it only a means of short circuiting funds out of the dole class through a different channel for which we receive no benefit.

Please give me your ideas-as any part that you will care to take in this-will be followed as closely as I can direct-for at least-I for one-fully appreciate the efforts that you have taken to help the situation.

Yours Respectfully.

Roy S Alexander

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

We have a fairly good set of records on the subject and will render every assistance requested-should you find thatit will be possible to either stop on your way-or send some here to view the situation.

Perhaps we are assuming to much-when we state-that it seems that a situation like ours should not permitt itself to get into such a tangle-but with us fellows an experience such as this only comes once in a life time-and we do need your assistance.

Would be pleased to hear from you-and as I am informed it is possable that you might be in Des Moines Office on later days of the week-am going there tomorrow and will call to see if such might by chance be the case-though I am not making this trip for this purpose alone.

Yours Respectfully.

Roy S Alexander

Member Town Council;

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

9/20/34.

Mr. A. C. Tester;
Iowa City;
Ia.

Dear Sir-

In a conversation with Mr. Weiters-over the phone-in regard to the Water Situation at Montezuma Ia.-he suggests that I get in touch with you-to find out what assistance you might be able to render the Town Council in helping us straighten out the Water situation in Montezuma Ia.

Thetown is practically out of water-and while I feel that we have the situation fairly well in hand-an opposition has sprung up-which under the present Laws of the State requiring a 60% majority vote-we have been defeated twice this summer in our attempt to float the Bond Issue of Ten Thousand Dollars.

It is not a controversy over the Bond issue-but one of the question of hard water or soft water-a series of springs or well-that the fight developed over-and it is so at lager heads that some one on the outside will necessarily have to be the Umpire.

We talked to Mr Stucky at What Cheer this A. M. and he suggested that we take the subject up with you-and follow your suggestions-also that you might stop over on your way to Des Moines and get a better view of the subject-in order to make a decision.

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

10/11/34.

Dr. A. C. Tester;
Iowa City;
Ia;

Dear Doctor;

First to express my appreciation of your remark;
"I view that locality with a regret that I am unable to promise a very satisfactory situation to help you very much"

And having access to the report which in its making you had submitted to you by your Mr.Stucky as a preliminary report-it well bears out-in my opinion-the thought that you would convey-in the above;

I was very much in hopes that you would be able to find time to visit our town-and go over the subject at first hand-as I feel that with the reports already submitted to you-and perhaps a visit-that we from that time on would be really going places.

My first thought is to extend every cooperation possible-but having a poit of stand still-it is as I understand-all now depending on your recommendations to Mr. Bodinot just where we go from here-and I assure you-that your efforts in our behalf-should terminate to your satisfaction and the Departments credit-if my efforts to be of any help will mean anything.

The old saying that no news is good news-can hardly be applied to our situation-and I wish to be placed under obligations to you-for such efforts as you may feel able to extend to us.

Yours Respectfully.,

Roy S. Alexander

ACT:A

A. C. Tester

September 30, 1935

Thorpe Well Company
2340 Sixth Avenue
Des Moines, Iowa

Att.: Mr. George Thorpe

Gentlemen:

The copy of your specifications and contract proposed for use in connection with the Montezuma deep well project came to my attention in due time. I am very glad to have this material for study and reference. I have gone over the contents of this set of specifications very carefully and have a number of comments to make which are for your consideration.

In your paragraph 6a, you guarantee 125 GPM production continuous pumping. You agree to drill deeper at your own cost provided the production does not reach this guaranteed amount. If by chance the water from the St. Peter sandstone should be highly mineralized or even salt water, do you think you would want to drill deeper? Experience shows that a highly mineralized water in a sandstone is an indication of more highly mineralized water at lower depths. For your own protection, would you want to go to the additional expense for deeper drilling in a case of water of unsatisfactory nature?

Paragraph 6b agrees to keep a complete log and samples taken at every 10 feet and at each change of formation. I suggest that the samples be taken at every 5 feet and at change of formation. There are many changes which occur within intervals of 10 feet which are of considerable geological importance, although they may not be obvious to the driller or even a geologist on the operation by examination at the time they are taken from the bailor. For this reason we like to have samples at the shorter intervals. A well that is being drilled with the man power that you usually operate can do this sampling without delay or added cost.

In the specifications included under paragraph 2, size and depth of deep well, you list the size of hole which you plan to develop and the depth of each string of temporary and permanent pipe and liners. I have made some calculations based on our more recent maps and studies of samples and have the following information on formations to help you in making your specifications.

Based upon the drilling of the test well the top of the shale portion of the Kinderhook formation should be reached at a depth of between 405 and 410 feet. The top of the solid portion of the Devonian limestone should be reached at about 570 to 580 feet, making a thickness of the shale of the Kinderhook about 175 feet.

The top of the Maquoketa shale should be reached at approximately 1115 feet and will continue to about 1325 feet, making a thickness of about 210 feet. This may vary 10 feet plus or minus.

There may be four or five feet of caving shale at the base of the Platteville or at the top of the St. Peter sandstone. The sandstone should be reached at 1615 feet to 1625 feet. A thickness of the St. Peter sandstone of approximately 40 feet is all that can be expected at Montezuma. The well should go five feet into the underlying dolomite.

You will note that the above computations modify your calculations slightly and that the footage figures given would not make a complete shut-off of the shale formations. You have, however, indicated your intention of shutting off both the Kinderhook and Maquoketa shale formations. In considerable portion of the Devonian and Silurian limestone you will find several shale beds and gypsum beds which may give some trouble during drilling. It may be desirable to set a temporary liner to shut off this material so that water, if any, will not contaminate the total supply. Unless the Devonian water is found to be very good, it would be shut off, of course, in the ultimate casing of the well.

If there are any other points suggested by the above information that you desire additional information, do not hesitate to call on me.

Yours very truly,

A. C. Tester

ACT:A

September 27, 1935

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

After talking with the Thorpe Brothers at Des Moines Monday morning, it seems that there is no particular objection to my attending the Council meeting in connection with your deep well project. In case this Council meeting is held during the middle part of the week, I am sure that I can make it a point to be there. If you will advise me when the meeting is called, I will make an attempt to come and assist you in any way possible.

Yours very truly,

A. C. Tester

ACT:A

September 17, 1935

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

Your letter of September 13 and the blue print were awaiting my return from a short trip to Tennessee.

I am somewhat surprised to learn that the understanding which you had with Mr. Hopkins concerning the development of the deep well at Montezuma has not materialized.

I believe that your well should be located so as to connect as closely as possible with one of your main line eight-inch cast iron mains. Obviously, this will restrict the location. However, since a well to develop the formations tested in your recent project and a well to develop the St. Peter sandstone are entirely different from the standpoint of pollution, I am making two suggested locations. For the deep well to the St. Peter sandstone I see no reason why a properly constructed well should not be placed at the most convenient point to the distributing system, which would be near the water tank between 5th and 6th Streets on Washington Street, where it can pump directly into the tank or against pressure in the water mains.

For the well of approximately 450 feet depth to the top of the Kinderhook shale a location south of Liberty Street is essential. The six-inch main running east on Dallas Street to Sixth Street should receive this supply and if a location can be obtained somewhere between Third and Fourth Streets or on Third Street south of Dallas Street, then a minimum amount of replacement of water main would be necessary. I think that it is desirable without question to have an eight-inch main connecting the well. It appears that at least one block and probably two blocks of six-inch main would have to be replaced with eight-inch pipe.

I believe that your Council would be wise in proceeding with the plan to develop a well to the St. Peter sandstone and obtain the additional money necessary by gifts, contributions, water bonds, or whatever methods may be available. Have you inquired from the bond house if they will issue more than $12,000 of revenue warrants?

I will try and make a stop at Montezuma at my first opportunity when in that vicinity.

Yours very truly,

A. C. Tester

ACT:A

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

9/13/35.

Dr. A. C. Tester;
Iowa City-Iowa;
Iowa State Geological Survey;

Dear Doctor;

Iam enclosing herewith a letter from Marsh Engineering Co. which initself is self explamatory-and would suggest that you note the location as of your opinion would be the most suitable.

I am following out the suggestion-but feel as things stand at the present-it will all be lost effort-but hope it will prove that my conclusions are all wrong in that respect;

They called me up to Des Moines yesterday- and everything the Hopkins told me about our project over the Phone-you will recall the day I called you about it-is all out of the picture.

As it now stands-we can take advantage of the $5700 grant if we care to and can abide by the restrictions now in force-and sell out $12000 in Bonds-which in the total will not be sufficient to carry out the recommendations that were made in your report.

Hopkins ays that we can file a new application if we care to-but in his opinion it will be but little use to do it-as he is sure that it will be turned down-they turned down 31 school houses for the Keffer-Thomas Co yesterday-representing a Million and a Half,

There is some possability that the Hopkins-Ickes fight is behind the whole thing and thereby hangs the tale-they seemed to think that somehting would happen in the next few days-that might clear the air-but would not change our position-from the $5700 grant angle.

As it now stands I would like to have you complete the request as to thelocation-and at least that will allow the Engineering Co., to complete their files covering the project-whether it is ever used or not.

I would ta ke into consideration-in making this location that it may be that we will be compelled to put this hole down in any event-sooner or later-and pay the full amount of the project-so that in setting as closely to the large pipes-that extension expense will be a minor item-considering the depth-you will be the better informed as to whether one point is more to be desired than another-when the size of the mains already laid would be ~~a saving in their use with a~~ new well. I was very much put out by the turn our plans have taken for you simply cant depend on anything that is told you-and feel that should some of these pet schemes not been born-that we would have been much better off-to much Santa Claus-and then again-perhaps we were not memebers of the Sunday School long enough before Xmas.

Would be pleased to have you make the location on the blue print and return as convenient for you-

Best Regards;

Roy S Alexander

CONSULTATIONS, INVESTIGATIONS, ESTIMATES, PLANS, SPECIFICATIONS, INSPECTION, SUPERINTENDENCE.

MARSH ENGINEERING COMPANY

JAMES BARNEY MARSH, PRESIDENT.

206-8
MASONIC TEMPLE

DES MOINES, IOWA. September 11, 1935.

TELEPHONE
WALNUT 2217

Mr. Roy S. Alexander,
C/o Palace Drug Store,
Montezuma, Iowa.

Dear Mr. Alexander:-

We are sending herewith a blue print map of Montezuma which was prepared as "Exhibit A" in your application.

We wish you would indicate on this blue print, as near as you can, the exact location of the proposed Deep Well so we may transcribe it on to the tracing before taking the final prints of this "Exhibit A". This would complete all information needed on prints.

We wish you would kindly indicate location of Deep Well, as above requested, and return the print to us at your earliest convenience.

Thanking you for your courtesy in the matter,
We Remain,

Yours Very Truly,

MARSH ENGINEERING COMPANY,

By J. B. Marsh

JBM-MP.

FEDERAL EMERGENCY ADMINISTRATION OF PUBLIC WORKS

STATE ENGINEER

407 Federal Court Bldg.,
Des Moines, Iowa
August 27, 1935

Professor A. C. Tester,
Geology Building, S. U. I.,
Iowa City, Iowa.

Dear Professor Tester:

This acknowledges with thanks copy of your report on the Montezuma well situation.

Cordially yours,

P. F. Hopkins

P. F. HOPKINS
Acting State Director PWA (Iowa)
For the Administrator

PFH-NEF

August 26, 1935

Mr. P. F. Hopkins
Acting Director
Public Works Administration
Federal Building
Des Moines, Iowa

Dear Mr. Hopkins:

At the request of Mr. Roy S. Alexander, Chairman, Water Committee, Council of the City of Montezuma, I am sending you herewith a copy of the report which I made on the development of a water supply at Montezuma. I believe you will find in this report facts and interpretations which will be of assistance to you in deciding on the merits of the project.

If there is additional information that you need, do not hesitate to call on me.

The Iowa Geological Survey is very anxious to keep in touch with the drilling projects for the development of water supplies in which your government agency is giving aid. We will be very glad to supply you with information to the fullest extent of our knowledge. In addition, we are very anxious to maintain accurate and complete records of wells that are drilled and of the amount of production and type of equipment.

Yours very truly,

A. C. Tester

Dictated, but not read

ACT:ML
Enc.

August 26, 1935

Mr. Roy S. Alexander
Montezuma, Iowa

Dear Mr. Alexander:

Your letter of August 22 came to my attention today upon my return from Des Moines. I am very glad to learn that you are already making good progress in getting proper preliminary arrangements concluded for the drilling of the deep well at Montezuma.

I have sent a copy of my report to Mr. Hopkins as you requested.

At this time I wish to call to your attention the last paragraphs of the report concerning the construction of the well and the matters to be included in your specification and contract concerning the taking of samples and the checking with the Geological Survey before setting of casing. In other words, we believe that a distinct advantage will be gained in the construction of this well by watching such matters very carefully.

Assuring you that I am vitally interested in the success of the Montezuma project and wish to be of all service possible in the completion of this job, I remain

Yours very truly,

A. C. Tester

Dictated, but not read

ACT:ML

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

8/22/35;

Dr. A. C. Tester;
Iowa City;
Ia.

Dear Doctor;

I have just returned from Des Moines where I completed arrangements for the Marsh Engineering Co to handle the arrangements for the new applications as refered to by our Phone call a few days ago-they will take care of the Town of Montezuma's interests.

In as much as John Marsh is now in one of the Departmen that has to do with such as this -it may be that we will be see some quicker action in getting the approval through-

Conferred with Mr. Shaw of Shaw, McDermitt & Sparks and he says they are ready to issue the $12000 bonds as soon as the other prodeedure is completed.

I now appeears that you will be consulted perhaps by these men and perhaps by Mr. F.P Hopkins and I have every reason to feel that you and your department will be as anxious to have this deep test completed as we will be to get it done.

This is just that you may know how we are proceeding.

Best Regards;

Roy S Alexander

THORPE WELL COMPANY

CONTRACTORS

LATEST ROTARY AND CABLE TOOL EQUIPMENT
THORPE PATENT GRAVEL PACKED WELLS

2340 SIXTH AVENUE
TELEPHONE 3-6107

DES MOINES, IOWA

PLEASE ADDRESS ALL REPLIES
DIRECT TO THE COMPANY

August 28, 1935.

Dr. A.C. Tester,
Ass't State Geologist,
Iowa City, Iowa,

Re; Montezuma, Iowa

Dear Dr. Tester,

Thank you very much for your letter together with copy of report and recommendations. We were concerned in your report because we wanted to avoid any possibility of conflicting opinions being submitted, thereby causing confusion in the minds of the city officials.

We are in exact accord with your opinions regarding the possibility of obtaining a better water by a properly constructed well into the deeper formations in that section.

Yours very truly,

THORPE WELL COMPANY

for J.P. Lawlor

August 22, 1935

Mr. J. P. Lawlor
Thorpe Bros. Well Company
2340 Sixth Ave.
Des Moines, Iowa

Dear Joe:

Enclosed herewith find a copy of my report to the City Council of Montezuma concerning the proposition of a water supply for that town.

I believe that you will find all of the information that you requested in your letter of August 21. The generalized log of the test well is included in this report as well as chemical analyses of the water from the test hole and other wells in the area. In addition, I included analyses of water from Grinnell for comparative purposes.

You will note that I recommended the drilling of a well to the Silurian beds, with the possibility that the well should go to at least the St. Peter, provided the water in the Silurian is not acceptable. On this basis the Council have made arrangements with PWA for a grant to add to the revenue bonds that they have available so that they should be able to drill such a deep well.

If any information is lacking from this report that you desire do not hesitate to make your request accordingly.

Yours sincerely,

A. C. Tester

ACT-LCA

THORPE WELL COMPANY

CONTRACTORS

LATEST ROTARY AND CABLE TOOL EQUIPMENT
THORPE PATENT GRAVEL PACKED WELLS

2340 SIXTH AVENUE
TELEPHONE 3-6107

DES MOINES, IOWA

PLEASE ADDRESS ALL REPLIES
DIRECT TO THE COMPANY

August 21, 1935.

Dr. A.C. Tester,
Assistant State Geologist,
Iowa City, Iowa.

Subject: Montezuma, Iowa.

Dear Dr. Tester,

I believe you have a record of the last test well we drilled for Montezuma, together with other well records that have been accumulated in that section. Mr. Thorpe tells me that you have also had a geologist over there making a study.

We are desirous of getting a suitable well water supply for Montezuma. If it is not too much trouble we would greatly appreciate a rather detailed letter setting forth your findings and recommendations relative to drilling for a satisfactory water supply at Montezuma.

With kindest Regards, I am,

Yours very truly,

Joseph P. Lawlor,
THORPE WELL COMPANY

May 6, 1935

Mr. Roy S. Alexander
Chairman, Water Committee
City Council
Montezuma, Iowa

Dear Mr. Alexander:

Your letter of May 1 reached me in due time. I trust that Doctor Rowser met you and passed on the information concerning our desire to be of service in your problem.

As you know, there is always some question concerning the possibility of the Emergency Relief giving you assistance because of the more or less complicated state of your finances and the circumstances of your previous development.

I am preparing a report to make to you which will be available this week, and then I will plan to stop at Montezuma sometime Friday, May 10, to discuss these matters at first hand.

Yours very truly

ACT:CB

Allen C. Tester
Assistant State Geologist

The Palace Drug Store

Roy S. Alexander

Montezuma, Iowa

5/1/35.

Dr. A. C. Tester;
Iowa City;
Ia.

Dear Sir;

At a meeting of the Town Councill last night-arrangements were completed for the issuance of Revenue Bonds to the extent of $12000 for improvement of the water system of Montezuma.

You may call to mind the situation in regard to water as was explained to you in Mr. Boudinots office at Des Moines by me and also that you sent Mr. Stuckey up here from What Cheer-and that he and I put in two or three days compiling records on the various wells in this locality-and perhaps a report was made to your office.

In as much as we failedto receive a single line from you in regards to all this-it seemed reasonable to apprise you of the fact that we have now reached a point where we must do something-and that you migh find time to make some suggestions-or dismiss the subject-that our recor might show that we had exercised good judgement in an attempt to take care of the Public needs as to the water supply.

I fully realize that they loaded you down with this work- and as long as we were not in shape financially to go ahead-felt that I should not raise the subject-but that angle now is cleared-and an expres ion from you may be of considerable help.

Yours Respectfully.

Roy S. Alexander
Chairman Water Comm.

Jack J. Hinman, Jr., Supervisor,
Sub-Project 1044 B,
P.O.Box 363, Iowa City, Iowa.

November 23, 1934

Mr. A. H. Wieters; Secretary,
Iowa State Planning Board,
State House,
Des Moines, Iowa.

Dear Mr. Wieters:

I have recently had some communication about the test well which was put down at Montezuma, and the relative hardness of this water and that of the Poweshiek County Home. As I understand it, a decision has been handed down by the Supreme Court, which will make the construction of new wells possible. Ought we have specimens from the test well or any other proposed new wells?

Yours very truly,

Jack J. Hinman, Jr., Supervisor,
Sub-Project 1044 B.

JJH/B

Copy for Mr. Tester

Sheet No. 1 Name of Well City Test Well No. 4 Survey No. W-0357

Curb Elevation = 941'

Location Montezuma, Iowa Date Drilled Dec. 1935 Analyst Talley

00

10

No Samples

20

30 30 Drift- lgt. brwn. and gry.-bf oxidized, in part unleached; in part, clay-like. leached: (Kansan gumbotil ?); Glacial sand, coarse, 5-10%.

35

N.S.

40 40 Drift. ylw-bf. oxidized, unleached, micac; Glacial sand, coarse, and pebbles of qtz., ls. and basic igneous rock up to 8 mm. 15-20%.

45 Drift. ylw-bf. oxidized, unleached, micac; Glacial sand, coarse, and pebbles of qtz, ls, and basic and acidic igneous rock up to 32 mm 30-40%.

50 50 Drift- Similar to 45-50 with Glacial sand and pebbles up to 16 mm 20-30%.

60 60 Sand; A to a. maj. gr. 1-1/2, prin. sub 2-1, max. gr. 4-2.

62 Drift. gray.-bf. oxidized. unleached micac; Glacial sand, coarse, (maj. gr. 1-1/2), and pebbles up to 16 mm. 30-40%.

70 70 Drift. ylw.-bf. oxidized, unleached, micac; Glacial sand, coarse (maj. gr 1-1/2,), and pebbles up to 8 mm. 20-30%.

75 Drift- Similar to 70-75

80 80 Drift ylw-bf. oxidized, unleached, micac; Glacial sand, coarse, and pebbles (ls.) up to 16 mm 15-25%.

Drift- ylw-bf. unleached, in part oxidized, in part med. gry. unleached unoxidized; Glacial sand and pebbles up to 8 mm 20-25%±

90 Drift, med. gry. unleached. unoxidized, micac; Glacial sand and pebbles up to 8 mm. 20-25%.

Drift. Similar to 90-95

100

Notes 12/21/35

Pipe @ 217' on 12/21/35 - Sand leak during drilling below 220'±
Sand sample at 247' taken 5 pm 12/21/35 showed much glacial
sand and fine silt - suggests a leak from glacial beds
above - or sand from crevice in ls -
Top of ls at 185' - overlain by coarse sd + gravel at base
of Nebraskan drift -
4" pipe was set on bed rock + drilling continued with
3 1/2" bit - 6" pipe set to shut out mud at 62'
Water level measured @ 217 ft = 116 ft. below curb -

Notes 12/23/35 Depth @ 290' when shut down for Christmas -
Water level measured after standing 2 Hours on 12/21 @ 247' depth
= 128 feet below curb -
Water level remained at 128 ft b.c. during drilling 247' to 290' -

Sheet No. 2 Name of Well Test Well No. 4 Survey No. W-0357

Location Montezuma, Iowa Date Drilled Dec. 1935 Analyst Talley

00	100	Drift, med grey unleached, unoxidized, micac; Glacial Sand and pebbles up to 8 mm. 15-20%
	105	Drift, med grey unleached, unoxidized, micac; Glacial Sand, coarse, and pebbles up to 8 mm., 10-15% ±
10	110	Drift, med grey unleached, unoxidized, micac; Glacial Sand and pebbles up to 16 mm 15-20% ±
	115	Drift, med grey unleached, unoxidized, micac; Glacial Sand, coarse, 5-10%; Ls and qtz pebbles up to 16 mm, 20% ±
20	120	Drift, med grey unleached unoxidized; Glacial sand coarse 15-20%; Pebbles up to 8 mm, 5% ±
	125	Sand, A to a, maj. gr. ½-¼ prin. sub. 1-½, max. gr. 8-4; Silt clay as cement, 15-20%
	127	Drift, med grey unleached unoxidized; Glacial sand, coarse 10% ±
30	130	Sand A to a, maj. gr. 1-1½, prin. sub ½-¼, max. gr. 4-2; Silt and clay med grey as cement, 30-40%
	135	Sand similar to 130-135
40	141	Sand. A to a. maj. gr ½-¼, prin. sub 1-½, max gr 4-2; Silt and clay as cement, med grey 25-35%
	145	Sand similar to 141-145 with silt and clay as cement 15-20%
50	150	Drift. med. grey. unleached. unoxidized. Glacial sand coarse, 10-15%
	155	Drift. med. grey unleached, unoxidized; Glacial sand, coarse, and pebbles up to 8 mm., 10-15% ±
60	160	Drift, med grey. unleached unoxidized, micac; Glacial sand, A to a, maj. gr. ½-¼. prin. sub. 1-1½, max. gr. 4-2. 30-40% ±
	165	Drift, med grey unleached, unoxidized, micac; Glacial sand, coarse and pebbles up to 8 mm. 15-20%.
70	170	Drift, med grey. unleached, unoxidized, micac; Glacial sand, coarse, and pebbles up to 8 mm, 20-25%.
	175	Drift, med grey. similar to 170-175
80	180	Drift. med grey unleached, unoxidized, micac; Glacial Sand coarse, and pebbles up to 16 mm. 40-50% ±.
	185	Ls. lgt grey: bf. dolo med to fine xline, granular friable, porous; Glacial sand and loess (to stop sand leak) 40-50%
	188	
90	190	Ls. lgt. grey - bf. dolo med to fine xline, granular, friable, porous; Glacial Sand and loess (to stop sand leak) 40-50% ±.
	195	Ls. lgt grey - bf. dolo med to fine xline, granular, friable; Chert. lgt grey fresh. 2-3%] 80% of Sample; Glacial sand, from above 20% ±
200	200	

Sheet No. 3 Name of Well Test Well No. 4 Survey No. W-0357

Location Montezuma, Iowa Date Drilled Dec. 1935 Analyst Talley

Ls dolo. gry.-bf. fine xline. granular. friable; Glacial sand from above 20-30%

Ls. gry. bf. dolo. fine xline, granular. friable; Glacial sand coarse, from above, 30% ±.

Ls. med brwn. fine xline. granular. friable; slightly ferruginous; Chert. wh. 2-3%; Glacial Sand 30% ±

Ls lgt gry.-bf dolo. powdered by drill; Glacial sand, 70% of sample.

Ls. lgt. gry.-bf., powdered by drill; Glacial silt and clay, from above, 30-40%

Ls. lgt gry. dolo. earthy texture. powdered by drill, slightly argillaceous; Chert, wh and lgt. gry fresh 5-10%] 90%; Glacial sand and silt; from above 10%

Ls. dolo: med. gry. bf. fine xline, compact; Chert, wh. and lgt gry. fresh, in part banded, 15% ±;] 60% of sample; Glacial sand and silt 40% of sample.

Ls lgt gry. dolo. med xline compact, finely comminuted by drill; Chert lgt gry., fresh 10% ±] 50%; Sand. coarse, and glacial silt and clay. from above 50%

Ls. dolo. lgt. gry.-bf. med. xline compact; Chert, wh. and lgt. gry. fresh, 10-15% ±;] 60% of sample: Glacial sand, coarse, and silt and clay. from above, 40%.

Ss. Ato a, maj gr 1/4-1/8. prin. sub 1/2-1/4. max. gr. 2-1; Silt and clay. 5%

Ss Ato a. maj gr 1/4-1/8 (75%), prin. sub 1/2-1/4 (25%) max gr. 1-1/2

Ss. A to low C, maj. gr 1/2-1/4 prin. sub 1-1/2, max. gr. 4-2; Sample labeled @ 250' "Water was shut off rock bailed out at 250", contains pebbles at 5b and 15 cherty, glauconitic

Ss. A to low C, maj. gr. 1/2-1/4, prin. sub. 1-1/2,

Ls. dolo. lgt gry-bf. med. xline, granular; Chert. wh. and lgt. gry. fresh, 5% ±; Sand A to low C maj. gr. 1-1/2, prin. sub. 1/2-1/4. (from above?) 35-40%.

Ss A to low C. maj. gr 1/2-1/4 prin. sub. 1-1/2, max gr 2-1; Ls. dolo. gry-bf med xline, granular. 5-10%: Chert, wh and lgt gry., fresh. 3-5%

Ls dolo lgt. gry. med to fine xline, granular, glauconitic; Chert. wh. and lgt. gry. fresh. 3-5%] 60% of sample; Sand, coarse, from above 40%

Ls. dolo. lgt gry. med. xline, granular, glauconitic; Chert, wh. and lgt. gry. 3-5%; Lits bryozoa. (See capsule)] 60-70% of sample; Sand, coarse, from above, 30-40%

Ls. dolo. lgt. gry. fine xline granular, glauconitic; chert, wh. and lgt gry, slightly oolitic. 10%;] 70% of sample; Sand, coarse from above 30%

Chert, wh. and lgt gry. fresh, containing imperfect oolitic structures, 60% ±; Ls. gry. bf. med xline, granular, 40% ±; Pyrite in xline aggregates, 2-3%] 40% of sample; Sand, coarse, from above, 10% ±

Sheet No. 3A Name of Well Test Well No 4 Survey No. W-0357

Location Montezuma, Iowa. Date Drilled Dec-Jan 1955-6 Analyst Talley

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90 290 Dol. lgt grey - bf glauconitic, granular, silty; Chert, wh. and lgt grey 10-15%; Sand, from above 3-5%±.

295 Dol. lgt. grey - bf. granular, silty; Chert lgt. grey 3-5%; glauconite, tr; Sand, from above 5%±

00 300

Sheet No. 4 Name of Well Test Well #4 Survey No. W-0357

Location Montezuma Date Drilled Dec.-Jan. 1937 Analyst Talley

300 300

Dol. lgt. gry. med xline, porous, silty (silt and very fine sand 15-20 o/o); Chert, wh and lgt. gry. 15-20%; glauconite, tr; pyrite, as minute xtals, 1%; Sand from above 5-10%.

305 Dol. similar to 300-305 with chert 20-30%

10 310

Dol. lgt. gry. med to fine xline, porous, powdered by drill; Chert, lgt. gry. 10-15% o/o±, glauconite, tr.

315 Dol. lgt gry similar to 310-315

20 320

No Samples 320-335

325

30 330

335 Dol. gry.-bf. med xline granular friable (dol rhombs cemented by dol. (s.); glauconite, 1%±; pyrite, 1% ±; grn. sh. 1%±; Sand, med., A to bare G, 5-10%.

40 340 Dol. bf.-gry. med. xline granular, friable (dol. rhombs in individual units); glauconite, tr.; Chert, wh., 1-2%; pyrite, tr; Sand, fine, A to a, 5-10% (from above?)

345 Dol bf.-gry. med to fine xline, compact; Chert, wh. 1%±; Sh. grn. 1%; Sand med. and fine, 5%± (from above?).

50 350 Dol. gry.-bf. med. to fine xline compact, fits. brach frags, crinoid stems, spicules; glauconite, 1%±; Chert, wh., lgt. and dk gry. 5%±; pyrite 1% in chert and dol; Sand, fine from above 5%.

355 Dol. med. gry. med xline (dol. rhombs cemented by calcite), friable; Chert, lgt gry. 2-3%; Grn. sh. 1%±;

60 360 Dol. Similar to 355-360 with chert lgt gry. 15-20%.

365 Dol. lgt. to med gry. med. xline (dol rhombs cemented by calcite), friable; Chert, lgt. gry. 3-5%;

70 370 Dol lgt. gry. Similar to 365-370 with chert, lgt gry. 10-15%

375 Dol. lgt. to med gry. med. xline (dol. rhombs cemented by calcite) friable; pyrite, tr.; [Chert, lgt. gry. 1-2%;] [Sh. gry. grnh. 2-3%.]

80 380 Dol. lgt to med gry. similar to 375-380

385 Dol lgt to med gry. med xline, Silty; granular; fits., crinoid stems.

90 390 Sls. lgt. gry. calc. 15-20% sol. (dolo cement), friable; (maj. gr. 1/16-1/32)

395 Sls Similar to 390-395.

400 400

Sheet No. 5 Name of Well Test Well No 4 Survey No. W-0257

Location Montezuma, Iowa Date Drilled Dec-Jan 1935-6 Analyst Talley

400 403 405

400 Sls. lgt. gry. calc 15-20% sol., friable, maj. gr. 1/16-1/32.

403 Sh. gry. grnh. calc. 2-3% sol., firm. silty micaceous; pyrite 1%.

405

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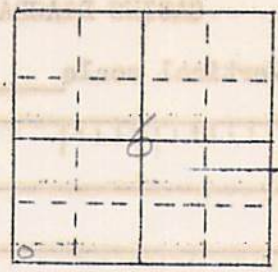
IOWA GEOLOGICAL SURVEY W-0357

In Cooperation with U. S. Geological Survey

RECORD OF WELL



Location:

Town: Montezuma (N E) (S W): County Poweshiek

SW¼ SW sec. 6 T 78 N., R. 14 W. Jackson Twp.

Well name and number Test Hole #4

Owner City of Montezuma. Address

Tenant Address

Contractor Thorpe Well Co Address Des Moines

Drillers

Drilling dates 1936.

Well data:

Elevations: Drilling curb 911 feet; Land surface feet

Determined by

Topographic position Upland near small valley slope

Total depth: Reported 1105 feet, Measured feet

Drilling method

Hole and casing data 154' of 20" pipe 0-154; 220' of 12" cast iron pipe 0-220'

Original depth to water ft. above/below Date

Original elevation of water level ft.; Source of data

Sources of water: Principal Osage dolomite; Others

Production data: Date April 9, 1937

Static depth to water 130 Measuring point

Pumping level 180. at 142 g.p.m.

Specific capacity g.p.m. per ft. drawdown; Temperature 53° °F.

Pump data: Type pump Turbine Column Dia. Length

Cylinder or bowls: Dia. Length Suction pipe

Power Electric Airline

Estimated rate of production: g.p.m. for hrs. a day

Use of water

WATER ANALYSES (in parts per million)

Date samples	April 9, 1937			
Sampled by	A C Tester			
Total solids	1991.0			
Insoluble matter	13.0			
Alkalinity (Meo)	244.0			
Alkalinity (Phn)	0.0			
pH	6.8			
$Fe_2O_3 + Mn_2O_3 + Al_2O_3$	14.0			
Alkali as sodium	79.9			
Calcium	317.3			
Magnesium	110.9			
Iron (unfiltered)	0.6			
Manganese	0.10			
Nitrate	0.09			
Fluoride	1.0			
Chloride	7.0			
Sulfate	1160.0			
Bicarbonate	297.7			
Hardness (ppm)	1250.0			
Hardness (gpg)	73.5			

Remarks

Laboratory data: Sample storage location

Sample range 30-405 No. spls. 85 No. dupls. & cond. 65 P-6.

Spls. prepared by Washed range by

Driller's log and cond.

Insoluble residues: Prepared by Studied by Strip log

Microscopic study Talley & Schultz SE&S strip log Kulp & Schultz, SE&S

Gen. log Correl. by Kulp & Schultz, SE&S

MONTEZUMA

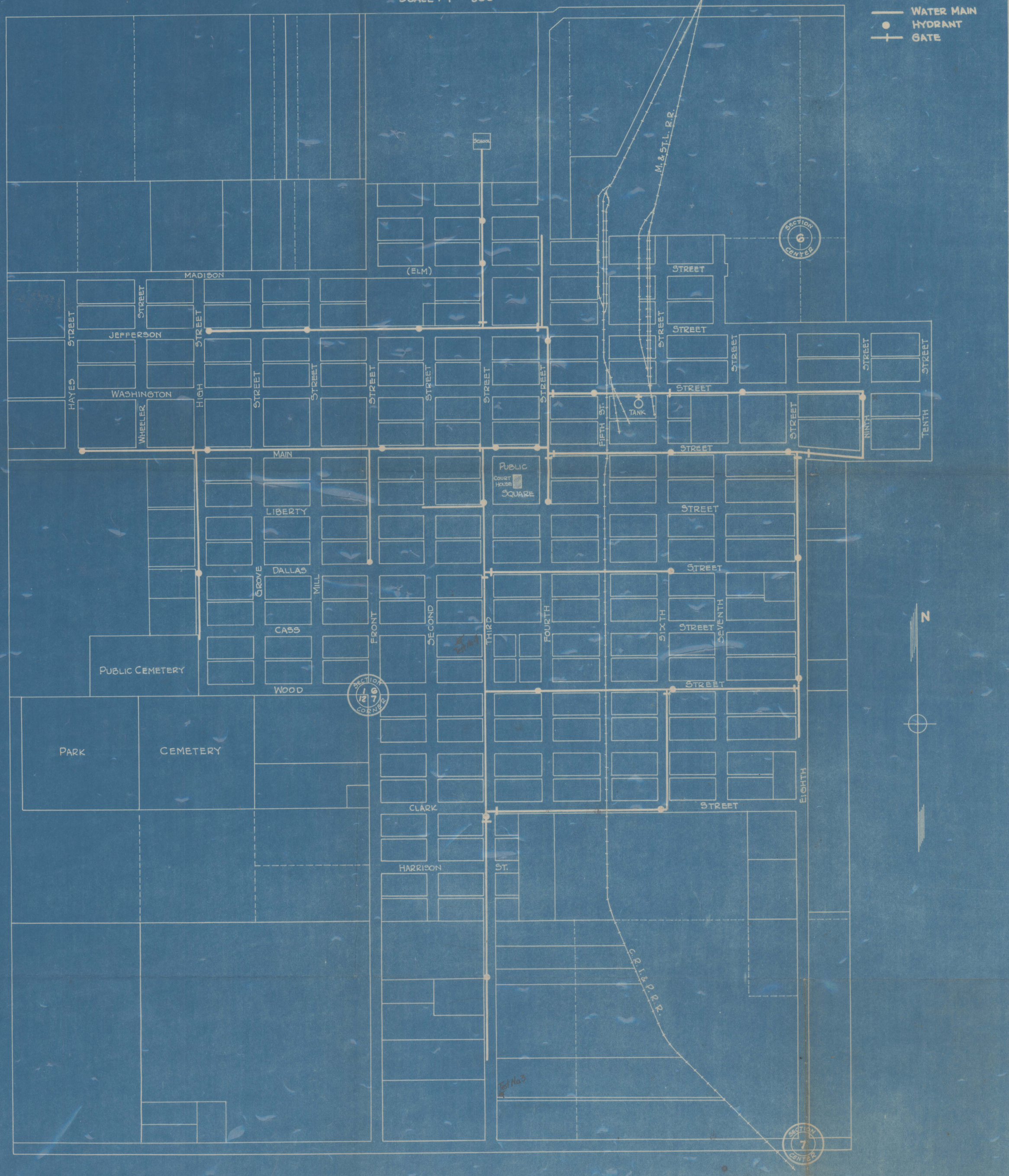
COUNTY SEAT OF POWESHIEK COUNTY, IOWA

WATER SYSTEM

SCALE: 1" = 300'

NOTE:
No. 2 source of supply, spring & reservoir located 2½ mi. this direction from tank..
No. 1 source, 2 wells near tank.

SYMBOLS
- WATER MAIN
- HYDRANT
- GATE



MARSH ENGINEERING CO.,
DES MOINES, IOWA

EXHIBIT A

Water from Montezuma's New Well Pumped Into Mains Today

Here is a view of the well digging machinery operated by the Thorpes in digging the new city well. In the background may be seen the residence of Geo. T. Jackson, one time prominent business man of the city and also a former mayor.

Here we have Lane Cowell with two of the Thorpe men shortly after the ground was broken for the well. All pictures of the well were taken by Joe Alexander.

Above is a photo of Lane Cowell, breaking ground for the new city well, which will soon furnish the water for the city. Note his deep concentration. 490 feet on down is the bottom of the hole dug by the Thorpes.

The new city well drilled by Thorpe Bros. of Des Moines has been completed, pumping equipment installed and water from the new well was pumped into the mains for the first time this morning. The city will have an abundance of water, for the equipment is set for 150 gallons per minute, although the tested capacity is 226 gallons per minute.

The total cost for the well, pump house and all equipment is about $11,000.00.

The well and pumping equipment has all been sterilized and as quickly as possible the mains will be flushed to free them of the likely accumulation of rust, sand and sediment, so that more than likely for a few days the water will be turbid due to this agitation and cleaning, but when done will not occur again as these mains will be flushed each year from now on, though from this source of water there will be small deposits made.

The pumping equipment of the well is furnished and installed by Zimmer Brothers Co. of Moline, Ill., and made by the American Well Works Co. of Aurora, Ill., and except as to size is one of the best and most complete to be found today.

Genuine wrought iron, bronze, stainless steel and monel metal are the components parts, all operated by a 20 h. p. U. S. electric motor and controlled by General electric automatic devices.

By pressing a button, this pump is put into operation, which continues until the elevated tank is full. It then automatically stops. Should the fire siren sound more water can be obtained by again pressing the button.

The town of Montezuma should be congratulated for having a council willing to not only devote their time but accept the abuse kindred to the subjects that come up before them, and to have carried the water question to a conclusion.

The town of New Sharon has pumping equipment similar to Montezuma, except as to size, obtained from Zimmer Bros. Co., which has pumped over 50 million gallons and outside of oiling has not been pulled or repaired since its permanent setting, and operates as quietly as when first installed, and has accumulated several thousand dollars in their water fund.

It is reasonable to expect that Montezuma will be on the approved list by the state board of health and roads leading into town will be posted "Municipal water supply approved by State Board of Health." This is something that few towns can boast.

Under State Supervision.

The entire construction of the well has been under the supervision of Dr. A. C. Tester through either Engineer Stooky or Talley at all times and samples of cuttings from the well were sent to the geological department at Iowa City, where a chemical analysis was made of them each day. Each porous formation bearing water was tested as to capacity and quality, a complete chemical qualitative and quantitative analysis being made, and recommendations made from these findings.

The state board of health through its engineer, Mr. Fiala, approved the location and construction, not only of the well but the pumping equipment and housing, and approved the blue prints submitted covering each and every part of the work.

As to the quality of the water, it will be classed as hard water, though of different composition than that to which we have been accustomed. It will not at the present or at any time in the future require treatment unless the source, which no one knows, becomes contaminated.

As to iron there is practically none, so there should be an absence of stains from that source. Practically all our iron was obtained from the old No. 2 well, which had to be used to keep up sufficient supply to take care of the demands.

Many questions are asked as to how they determine where to locate a well for a quantity of water, as it is quite well understood that no one can see under the ground, so the answer is: Only experience with the locality as to records that may be obtained, if kept, and by test holes to get this experience.

The state maintains a geological department under supervision of experienced engineers who devote their time to compiling records for just such information, and this information is available to every one upon request. However, in this instance there were none available closer than New Sharon, Grinnell, Oskaloosa and Williamsburg, all so far removed except Grinnell to be of little use.

Operating Costs.

Operating costs will be low. At the present rate of electricity charges the cost will be six cents per thousand gallons pumped. The cost to the consumer is 35 cents per 1000 gallons, and the difference will show a profit which will rapidly retire the bond issue. The labor costs will also be small as it will take about ten minutes a day of Lane Cowell's time to oil the equipment. The well is so constructed that no oil can get into the water. The balance of Mr. Cowell's time can be devoted to other departments, which is badly needed. The total oil used will be about one-half gallon per month.

Study Chart.

A chart drawn to the scale of 40 feet to one inch appears on this page, which shows the well construction and the depth of the various formations. Study it carefully for it is correct and accurate.

A request was made to the state geological department for assistance and a personal contact was made with Dr. A. C. Tester, assistant state geologist, who immediately made it a matter of first order to help Montezuma.

At the same time the request was made for information on a well, financial assistance was also secured, which resulted in a federal grant of $4,500, with the provision that the town vote security to the bondholders who would furnish the balance of the money. This was a government requirement that the well be dug and not place the money in some other fund and not use as directed.

An election was also required. This resulted in the defeat of the proposition by only nine votes and was due to a misunderstanding of the proposition and also to the spreading of some false rumors. Because of the defeat of the proposition the $4,500 was withdrawn by the government.

The city water supply of Montezuma had been condemned by the state board of health repeatedly over a period of five years, and was allowed to be used only after it was treated, and they had their engineers appear frequently and take samples of the water to see that their requirements were being followed.

In addition to this the insurance department had warned that a readjustment of fire insurance rates would be made unless something was done to insure them that an adequate supply of water was available in case it was required. But because of a constant effort being made to attain this end, no adjustments were made.

Dr. Tester made frequent visits to Montezuma and sent Engineer Stooky here to render all the help that he could. Records were made of the major wells in this locality, from Deep River to Searsboro, Barnes City to Grinnell, Brooklyn to New Sharon, depth and size of the wells, how deep to the rock, the water level, capacity of the wells, and a gallon sample of water taken from a great number of them and sent to the state laboratory at Iowa City, where a complete chemical analysis was made to determine the quality.

Maps Are Made.

From all these records a map was made and when completed recommendations were made on the basis of the findings. To quote the state geological department: "There is no opportunity for Montezuma to obtain a better quality of water within the depths tested. As recommended in the first report the only chance for Montezuma to obtain a good quality of water is to develop the St. Peter sandstone at a depth of approximately 1650 feet. Shallow wells developed from the pre-glacial channels north (English) or southwest (Moon Creek) would require an expensive pipe line. Analyses of water from wells producing from the old glacial channels do not show a major improvement so far as hardness and iron content are concerned."

With the loss of the government grant the only funds that were available were through revenue bonds, but only in an amount that would allow the development as was made, and these will be paid off from the profit made in the operation of the well, and spring, which will stand idle until sufficient water has accumulated in the ground to allow its operation on at least a cost basis. Its capacity at no time has exceeded 10,000 gallons per day in the last two years, about a fourth of our requirements, but will not be abandoned.