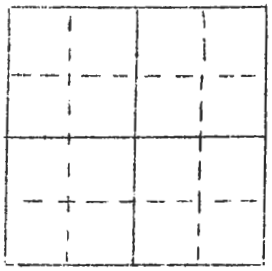
IOWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey

W-0424

RECORD OF WELL



Location:

Town: PRIMGHAR (N E / S W); County O'BRIEN

1979 field located NW, NE, SE, SE sec 36, T96N, R41W

SE sec. 36 T. 96 N., R. 41 W. Summit Twp.

Well name and number City of Primghar

Owner _____ Address _____

Tenant _____ Address _____

Contractor Rasmussen Well Co. Address Sioux City

Drillers _____

Drilling dates 1928

Well data:

Elevations: Drilling curb 1505 feet; Land surface _____ feet

topo elev 1525'

Determined by _____

Topographic position Upland

Total depth: Reported 421' 9" feet, Measured 421' 9" feet

Was 432 plugged back to 421' 9"

Drilling method cable

Hole and casing data 413'4" of 12" drive pipe

(Give amount, size, kind, and depth of all casing; type and position of seals and packers; cementing; how finished--perforated pipe, screen, gravel pack, open hole, etc.)

11½" screen top 8'=16 slot, bottom 10'=20 slot 19'6" long

Top 2' of strainer blank. Lap 6'10" between screen & 12" pipe

Original depth to water 308 ft. ~~above~~ below curb Date _____

Original elevation of water level 1197 ft.; Source of data driller

Sources of water: Principal Pleist 400-420; Others _____

CASING DIAGRAM Vertical scale _____	LOG

Production data: Date _____

Static depth to water 308 Measuring point _____

Pumping level 353 at 62½ g.p.m.

398 125

Specific capacity 1.3 g.p.m. per ft. drawdown; Temperature 51 °F.

Pump data; Type pump Turbine Column Dia. _____ Length 360'3"

Cylinder or bowls: Dia. _____ Length 9' Suction pipe 30'

Power Electric 10h.p. motor Airline 407'2

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

Use of water City supply

WATER ANALYSES (in parts per million)

Date sampled	Aug. 3, 1936			
Sampled by	A.C. Tester			
Total solids	2085.0			
Insoluble matter	88.0			
Alkalinity (Meo)	340.0			
Alkalinity (Phn)	0.0			
pH	7.0			
Fe_2O_3+ Mn_2O_3+Al_2O_3	-			
Alkali as sodium	96.80			
Calcium	337.30			
Magnesium	83.20			
Iron (unfiltered)	0.7			
Manganese	2.50			
Nitrate	01.30			
Fluoride	0.0			
Chloride	17.0			
Sulfate	950.70			
Bicarbonate	414.80			
Hardness (ppm)	1178.0			
Hardness (gpg)				

Remarks H_2S odor strong

Laboratory data: Sample storage location _____

Sample range 412 - 430 No. spls. 5 No. dupls. & cond. 5 fair

Spls. prepared by _____ Washed range _____ by _____

Driller's log and cond. yes fair

Insoluble residues: Prepared by _____ Studied by _____ Strip log _____

Microscopic study _____ strip log 9/15/52

Gen. log _____ Correl. by _____

WATER LEVEL DATA

Measuring point _____

Date	Depth to water	Altitude	Remarks

REMARKS

Treated with acid Dec. 1935 (30 gals muriatic acid) Commercial grade concrete. Run down three 1/4" pipes Left in well about 18 hours Increased production materially

MASTER CARD – A 9-26-69

STATE	COUNTY	LATITUDE DEG.	LATITUDE MIN.	LATITUDE SEC.	LAT N. or S.	LONGITUDE DEG.	LONGITUDE MIN.	LONGITUDE SEC.	SEQ. NO.
1 2	3 4	5 6	7 8	9 10	11	12 13 14	15 16	17 18	19
19	71	43	05	00	N	095	38	00	1

WELL SCHEDULE

US GEOLOGICAL SURVEY

IOWA DISTRICT WRD

WELL NO. 096-41W-36D CO. O'BRIEN

OWNER CITY OF PRIMGHAR ADDRESS PRIMGHAR, IOWA

DRILLER RASMUSSEN WELL CO. DATE DRLD. 1928

MAP 1:63,360 COUNTY HWY.

SOURCE OF DATA FILE

DESCRIPTION M. P. LSD FEET (ABOVE) (BELOW) LSD 1505

CONTINUED FROM ABOVE	ACCURACY	LOCAL WELL NUMBER T.	R.	E/W	SEC.	QUARTERS	LOCAL USE W-NUMBER	OPTIONAL	OWNER OR NAME	OWNERSHIP	WATER USE	WELL USE	WELL DATA	FREQ. W/L	FIELD CHAR.	HYD. LAB.	QW-DATA	QW-FREQ.	PUMPAGE	APERTURE	LOG DATA	CARD DESIG.
	20	21 22 23	24 25	26	27 28	29 30 31 32 33 34	35 36 37 38 39	40 41 42 43 44 45 46 47 48 49 50 51	52 53 54 55 56 57 58 59 60 61 62 63 64 65 66	67	68	69	70	71	72	73	74	75	76	77	78 79	80
	4	096	41	W	36	D	00424	//28CITY	PRIMGHAR IOWA	M	P	W	3	Ø			C	Ø			GD	A

WELL-DESCRIPTION CARD – B

DUPLICATE CARD A CC 1-19	DEPTH OF WELL	ACCURACY	DEPTH CASED OR FIRST PERF.	DIAM. INCHES	WELL FINISH	METH. DRILLED	YEAR DRILLED	PUMP SETTING	METH. LIFT	DEEP/SHALLOW	POWER	ALTITUDE OF LSD (FEET)	ACCURACY	WATER LEVEL (FEET)	ACCURACY	DATE MONTH	DATE YEAR	YIELD OF WELL (GPM)	METH. DET.	DRAW-DOWN (FEET)	ACCURACY	PUMPING PERIOD (HOURS)	QUALITY OF WATER IRON	SULF.	CHLOR.	HARD	S.P. COND.	TEMP.	DATE SAMPLED	CARD DESIG.
	20 21 22 23	24	25 26 27 28	29 30	31	32	33 34 35	36 37 38	39	40	41	42 43 44 45 46	47	48 49 50 51	52	53 54	55	56 57 58 59 60	61	62 63 64	65	66 67 68	69	70	71	72	73	74 75 76	77 78 79	80
	423		413	12	S	C	928	398	T	D	V	1505	7	308	D	28		125		903			48	19				51	836	B

HYDROGEOLOGIC CARD – C

DUPLICATE CARD A CC 1-19	PHYS-IOG-RAPHY PROV.	SEC.	DRAINAGE BASIN	SUBBASIN	TOPO SETTING	MAJOR AQUIFER SYSTEM	SERIES USGS	SERIES IGS	UNIT	LITH-OLOGY	ORIG.	THICK-NESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	MINOR AQUIFER SYSTEM	SERIES USGS	SERIES IGS	UNIT	LITH-OLOGY	ORIG.	THICK-NESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	DEPTH TO CONSOLI-DATED ROCK	SOURCE	DEPTH TO BASEMENT	SOURCE	SURF. MAT. LITH-OLOGY	SURF. MAT. INFIL.	COEF. TRAN. SIG. FIG.	COEF. TRAN. XIO	COEF. STOR. SIG. FIG.	COEF. STOR. XIO–	GEOL. CROSS CARD DESIG.	CARD DESIG.
	20 21	22	23 24 25	26	27	28	29	30	31	32 33	34	35 36 37	38 39 40	41 42 43	44	45	46	47	48 49	50	51 52 53	54 55 56	57 58 59	60 61 62 63	64	65 66 67 68	69	70 71	72	73 74	75	76 77	78	79	80
	12	B	36	C	F	Q	G	G	X	3	S	0			9	3	9	0										8T	4						C

CASING AND SCREEN (SIZE, TYPE, INTERVALS):

413'4" OF 12" DRIVE PIPE

11½" SCREEN

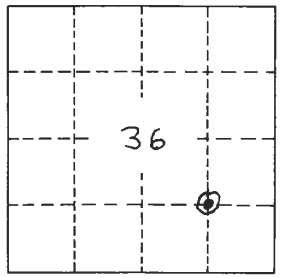
ORIGINAL T.D. 432 FT. – PLUGGED BACK.

CODED BY D. AARONSON DATE 26 MARCH 1970

PUNCHED BY T DATE

VERIFIED BY DATE

SKETCH ON REVERSE: YES NO ✓



WELL NO. 096-41W-36D

Sheet No. 1 Name of Well PRIMGHAR Survey No. W-0424

Location City of Primghar west side reservoir in Fire Station Date Drilled 193 Analyst Tester

Curb Elev: 1505

00

10

412 Sand, speckled blk; med to coarse, maj grade 1-½ mm, prin. subs ½-¼ and max size (except few grains) 2-1 mm; ang-subang, few curvl; some small grains sub-rd; most grains show water abr & frosting. Abund. access mins, ilmenite, leucoxene, amph & pyroxene, plag felds, olivine?) chlorite, jasper, qtzite, garnets, orthoclase, ls, dolo, etc. al. all ± fresh & unaltered

415

20

422 Sand, like 412-415, about same texture and mineral comp.

426 Sand, like 422-426, but with mixture of iron (buff) concretion like cement masses of fine grnd well sorted micac. Ss - like Dakota Ss in pebbles, but easily disaggregated. These very fine grnd Ss units are chiefly qtz grains and very few access. mins.; Some of the pieces appear bedded, others suggest aggreg. in sample.

429

30

430 → Sample marked 430'

Sand and fine gravel, water worn and frosted coarse grains like 412-15 but with fresh angular chips of a hard, tight hematitic siliceous concretion which breaks like a qtzite; the coner. show fine qtz sd, mica & typical structure of Dak Ss. Several larger pieces of buff to orange iron colored fine, micac. Ss - all prob. congl. grains & pebbles and coner. in drift (?) sand.

40

50

Sample of sand cleaned out of reservoir collected from dump pile represents collection of over a year of sand pumped from well. Shows amed. to fine grnd texture, much angular to curv, much with sharp edges and fresh breaks. Access. mins abund. Fragments of fine sand like Dak. Ss pebbles in 426-430. Probably sand from zones 412-426 ± (zones above not sampled), as sample is dominated by material like 412-415.

60

70

80

90

00

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 096-41W-36D
Aquifer Code(s) QGGX
Owner's Name PRIMGHAR, IOWA (1928)
W Number 00424

Card Q

State: IOWA [19] (1 2) County: O'BRIEN [71] (3 4) Town: PRIMGHAR, IOWA

Well No. Latitude [4305000N] (5–11) Longitude [095380 0] (12–18) Seq. No. [1] (19) Date M D Y [080366] (20–25)

Sampling Depth [422] (26–29) Type [1] (30) Kx10^6 (31–35) pH [7.0] (36–38) Temp. °F [51] (39–41)

SiO_2 (42–44) Ca [332.] (45–49) Mg [83.] (50–53) Na +K [97.] (54–58) K [.C] (59–61)

HCO_3 [415] (62–65) CO_3 (66 67) SO_4 [951.] (68–72) Cl [17.] (73–78) Source No. [3] [Q] (79 80)

Card R

Duplicate Columns 1-25 from Card Q

F [0.] (26–28) NO_3 [.3] (29–32) PO_4 [.15] (33–35) B (36–38) Al (39–41) Fe [.7] (42–45)

Mn [2.5] (46–49) Cu (50–52) Pb (53 54) Zn (55–57)

Solids Determined [2080] (58–63) Calc. (64–69) Hardness Ca,Mg [1180] (70–73) Non-Carb. [840] (74–77)

Color (78 79) No. [R] (80)

Card S

Duplicate Columns 1-25 from Card Q

Br (26–28) I (29–31) Alk. as $CaCO_3$ [340] (32–35) Free CO_2 (36–38) SAR (39–41)

RSC (42–44) ABS (45–47) (48–50)

Alpha (pc/l) (55–57) Beta (pc/l) (58–60) Ra (pc/l) (61–63) U (ug/l) (64–66)

No. [S] (80)

Recorded by: D. AARONSON

Punched by: T Date:

Published:

IOWA GEOLOGICAL SURVEY
FINAL
Water Analysis Report

County O'Brien Date Sampled August 3, 1936

Town Primghar : Sampled by A. C. Tester

Location of Well: ____ ¼, SE¼, Sec. 36, T. 96 N., R. 41 W.

At fire station next to concrete reservoir.

Owner City of Primghar Well No. ____; T.D. 432* ft.

Type of Well Drilled Curb Elevation 1505 ft.

Producing Formation(s) ~~Cretaceous~~ Basal Pleistocene Sand Depth range 400-420 ft.

Remarks on Condition of Well, Casing or Formations Well screen treated with 30 gals. HCl Nov. 1935. *Well plugged back to 421'9".

Impellors (bottom) @ 368' + 30' suction pipe

Constituents	Parts Per Million	Constituents	Parts Per Million
Total Solids	2085.0	Magnesium (Mg)	83.20
Dissolved Solids	---	Iron(Fe)(unfiltered)	0.7
Insoluble Matter	88.0	Iron(Fe)(filtered)	---
pH	7.0	Manganese (Mn)	2.50
Alkalinity (Me0)	340.0	Aluminum (Al)	---
Alkalinity (phn)	0.0	Fluorine (F)	0.0
R_2O_3	---	Chlorine (Cl)	17.0
Nitrogen as Ammonia(NH_4)	1.0	Sulphate (SO_4)	950.70
Nitrogen as Nitrite(NO_2)	0.004	Bicarbonate (HCO_3)	414.80
Nitrogen as Nitrate(NO_3)	0.30	Phosphate (PO_4)	0.15
Alkalies as Sodium(Na)	96.80	Borate (BO_3)	1.0
Calcium (Ca)	332.30	Calculated Hardness	1178.0

Temperature: Water 51 °F, Air 89 °F, Measured ~~at~~ 8' from pump.

Remarks: S.L. 308', D.D. 90' @ 125 gpm. in 3 min; dd. 45' @ 62 gpm. Strong H_2S odor. This is a drift well

Analysis by State Water Analysis Laboratory, Dr. J. J. Hinman Jr., Director, Iowa City, Iowa. Lab.No. 106,192, Date August 19, 1936

Sent to:
Date:

RASMUSSEN BROS. WELL CO.

RUSSELL
PHONE
5-7595

~~3604~~ FOURTH AVENUE
SIOUX CITY, IOWA

HOWARD
PHONE
6-6219

CITY WELL - PRIMGHAR, Iowa
January 20,1932

Well is 426 feet deep, measured from bottom of screen to top of 12 inch pipe.
Well is cased with 12 inch drive pipe extending from 0 to 415 feet.
19 ft. 6 inches of 11½" Johnson all brass well screen,slot No. 16 and 20.
Screen has a lap of 6 ft. and 10 in. inside of 12 inch pipe, the top 3 ft. 6 inches of screen is blank.
Well tested at 125 gallon per minute with about 100 ft. draw down.

Formation of soil

0 to 50'	Yellow Clay
50' to 190'	Blue Clay
190' to 210'	Yellow Clay and large stone
210' to 255'	Blue Clay
255' to 360'	Shale and Blue Clay
360' to 390'	Yellow Clay
390' to 411'	Fine black sand
411' to 430'	White Sand

5/3/36

Primghar

T.D. 426' 1928. 12" at surface.
Measured Oct 17-1935 421' 9"

Drop pipe 360' 3" below motor base
Pump 7' 9" - Turbine
Suction pipe below impellers - 30'

398' = Drop pipe + impellers + tail piece
6" screen @ 20' long

Pumps 62½ g.p.m. (15000 gals in 4 hrs)
S.L. @ 308' air line 407' 2"?
D.D. @ 90' @ 145 gpm probably to bottom
" @ 45" @ 62½ gpm of suction @ 398'

Treated with acid in Dec? 1935
30 gals

40 H.P. motor = 1800 rpm

398
90
308'

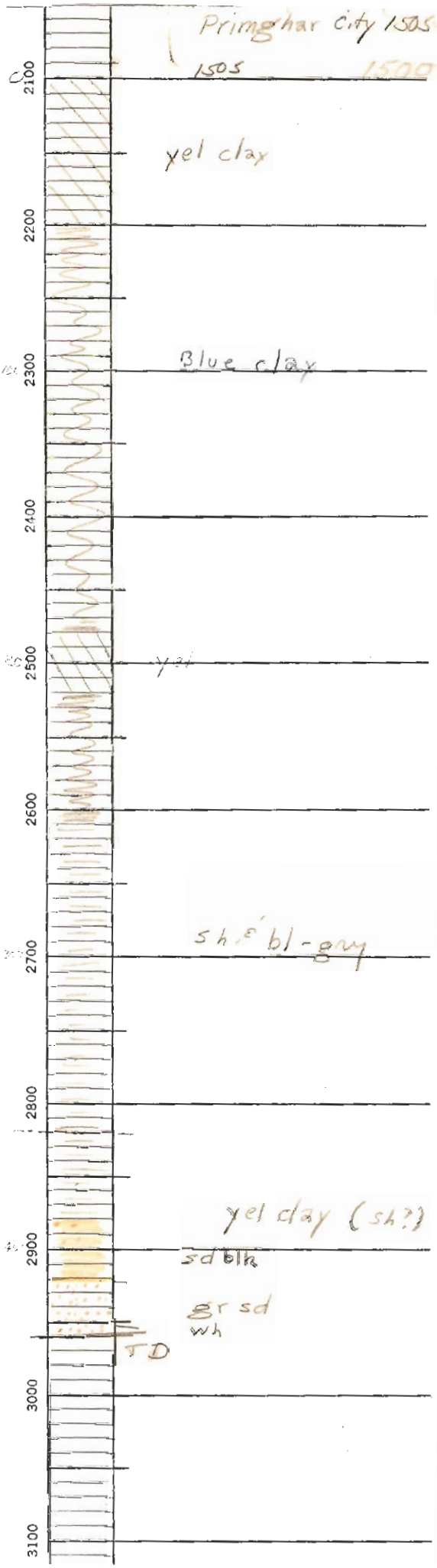
Reservoir 120,000 gals
Use cap of 72,000 gals
to 6 ft depth.

Sample G-54 - after 15 min pumping -
Temp 51°F Air 89°F

SO₂ odor - slightly milky
Air gauge - 45" after 15 min

City Clerk James Metcalf
Send copy of analysis & statement of water to him

J. A. Andersen - Water Supt.



April 8, 1944

The Mayor
Primghar, Iowa

Dear Sir:

In response to your request received through Mr. Howard Rasmussen of Sioux City we are sending you a brief forecast of the water-bearing horizons at Primghar.

No samples are available from the present city well except of the sand at the base. However, samples were kept from the O'Brien County Home well about a mile and a half away and a study of them has been made.

There appear to be two main water-bearing horizons at Primghar. The first at the base of the glacial drift is a glacial sand composed largely of sand from the Dakota. This is apparently the source of the present city supply. Below this, possibly lying immediately under it or separated from it by a rather thin shale, is the Dakota sandstone. The latter is the source of water at the County Home.

The glacial sand was penetrated at a depth of 390 feet in the present city well and apparently the base was not reached at 430 feet, the bottom of the hole. The top of the Dakota sandstone should be at about 450 feet. Should the two water-bearing zones be contiguous there would probably be no sharp line between them.

There may be a lower Dakota sandstone present at Primghar below which lies dolomites and possibly sandstones of Paleozoic age. There is little information as to the quantity and quality of water which may be expected from water-bearing beds in these lower rocks. It would appear that an ample supply of water can be developed in the Dakota sandstone which underlies the drift.

The quality of water in the Dakota sandstone should be better than that in the overlying glacial sands. Hence it is thought to be advisable to drill into the Dakota and case out the glacial water. At the County Home 80 feet of clean Dakota sandstone was penetrated before shale was encountered.

I hope this gives you the information which you desire. We should be glad to study the samples for you as the well is being drilled. If there is anything more which we can do please feel free to call upon us.

Very truly yours,

S. E. Harris, Jr.

SEH:N

Elev. Hale 1505

August 31, 1936

Mr. James Metcalf
City Clerk
Primghar, Iowa

Dear Sir:

On August 8 I visited your city and discussed with Mr. Anderson, your water superintendent, various circumstances in connection with your deep well. I collected four samples, representing intervals between 412 and 430 feet, of material that had been preserved from the drilling of the well. Unfortunately, a complete set of samples is not available, and it makes it very difficult to reach conclusions that are entirely satisfactory without accurate information. Mr. Anderson asked that I advise the city concerning my findings in connection with these samples and the chemical analysis of the water sample which I took at the same time.

It appears that your well is producing water from a medium-grained sand which lies above the Cretaceous formations and at the base of the Pleistocene or glacial drift deposits of the area. The sample between 426 and 429 and that marked at 430 feet both contain aggregates of sand which is of a type recognized as related to the Dakota sandstone formation, but I have interpreted the material as being reworked material derived from the Dakota sandstone but included in the glacial sand. In the sample marked at 430 feet there are typical hard iron and silica cemented fragments of sandstone which I believe represent a boulder in the base of the drift. It is possible that the Dakota sandstone lies not far below, but the drill cuttings which I have examined do not show that the sandstone formation has actually been drilled. The composition of the water also verifies that the production is from the glacial drift and not from the Dakota sandstone. A report on this analysis is enclosed herewith.

There are several things which might be done to this well to eleminate the difficulties that you have been having, and I believe it is perfectly possible to obtain a better grade water supply with less sand contamination than you have been having. However, I wish to obtain further information from the driller concerning the treatment of the well, and the screen and casing before reaching a definite conclusion. Any information which you can give me concerning the size of the casing, the slot number of the screen, and other dimensions will be appreciated.

Yours very truly,

A. C. Tester

ACT:A
Enc. 1

CC: Mr. Russell Rasmussen

0-50 ylw clay
50-190 blue clay
190-210 ylw clay + large rx
210-255 bl clay
255-360 sh + bl-gry.
360-390 ylw clay (sh?)
390-414 fine blk sd
414-436 sd, gry-
436-430 drilled in

413'4" of blk 12" drive pipe 45# per ft.
12" Johnson screen 16 + 20 slot 18' long
Top 2ft of strainer blanked - lap 6'10" between screen + 12" pipe - top 8' → 10'
S.L. 308'

30 gals - muriatic acid Comil grade concr
Run down thru 1/4" pipe -
Left in well about 18 hours -
Decreased productions materially

August 31, 1936

Mr. Russell Rasmussen
Sioux City, Iowa

Dear Russell:

You will note that I am sending a report to Primghar, as requested by the water superintendent. I hesitate doing this before receiving an answer to my letter to you of August 6 in which I asked for certain information concerning the job, but since the city requested my report I could not delay it any longer. I still want to get the information about the casing and the screen. I am learning a great deal about the water supplies of northwestern Iowa some of which surprises me, as it is becoming apparent that the Dakota sandstone and other producing horizons of the Cretaceous are not being utilized as completely as is possible. In other words, there has been a definite confusion with Dakota sandstone of a glacial sand and a sand of possible Tertiary age and fine sand of Upper Cretaceous age, all of which produce poor water.

All of this means that the future for development of good water supplies in northwestern Iowa is better than I had anticipated, and further it will mean very careful study of each and every well which, of course, must be based upon accurate drill cuttings.

Yours very truly,

A. C. Tester

ACT:A

August 6, 1936

Mr. Russell Rasmussen
3604 Fourth Avenue
Sioux City, Iowa

Dear Russell:

Thank you for your letter of July 21 giving the information on the new 16-inch city well at Orange City.

I stopped at Primghar Monday afternoon and had a good conversation with Mr. Andersen and learned considerable about the well. I took a sample of water for a new chemical analysis, as our first sample was taken before your treatment of the well with hydrochloric acid.

There are several things that I would like to learn about the well that could not be furnished by Mr. Andersen. Will you give me the information concerning the size and length of casing and type of seal, if any, used between the different sizes? Also, what is the size of screen as to length, diameter, and slot number?

How much acid was used, what strength, and what type? I presume it was a commercial grade concentrated hydrochloric (muriatic) acid. I understand that about thirty gallons were used. Is this correct?

According to the mark on the airline gauge, the base of the bottom of the airline is at 407 feet 2 inches. Is that correct, as I understand the bottom of the suction pipe below the impellors is at 398 feet?

According to Mr. Andersen and the tests which we made, the well is pumping approximately 62 per minute with a drawdown of about 45 feet.

485
385

I collected four samples of cuttings which had been preserved at the fire station which show the depth to be about 432 feet. I understand the well was plugged back to about 422 feet. Is this information correct?

If you have your driller's log of this well, I will appreciate receiving it along with the rest of the information. Just as soon as I get all these data together, then I hope to have something to report to you.

Yours very truly,

A. C. Tester

ACT:A
Dictated August 5.