W 6565

ICWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey
RECORD OF WELL

Location:

Town: Estherville (NE) (SW) :County Emmet

SW NE SE sec. 10 T. 99 N., R. 34 E. W. _____ Twp.

Well name and number Estherville Town Well No. 6

Owner _____ Address _____

Tenant _____ Address _____

Contractor Thorpe Well Co. Address _____

Drillers _____

Drilling dates 1953

Well data:
Altitudes: Drilling curb _____ feet; Land surface _____ feet

Determined by _____

Topographic position _____

Total depth: Reported 915 feet, Measured _____ feet

Drilling method _____

Hole and casing data _____

Original depth to water _____ ft. above below Date _____

Source of data _____

Sources of water: Principal _____

Others _____

Production Data

Date				
Static water level				
Measuring point				
Pumping water level				
Yield (g. p. m.)				
Duration of pumping				
Specific capacity				

Pump Data

Type pump _____ Column diameter and length _____

Cylinder or bowls diameter and length _____

Suction pipe _____ Airline _____

Power _____ Production _____ g. p. m. for _____ hours per day

Use of water _____

Dissolved constituents and properties (in parts per million except as indicated)

Date sampled				
Sampled by				
Silica (SiO_2)				
Iron (Fe)				
Manganese (Mn)				
Calcium (Ca)				
Magnesium (Mg)				
Potassium (K)				
Sodium (Na)				
Carbonate (CO_3)				
Bicarbonate (HCO_3)				
Sulfate (SO_4)				
Chloride (Cl)				
Fluoride (F)				
Nitrate (NO_3)				
Dissolved solids				
Hardness (as $CaCO_3$)				
Total				
Grains per gallon				
Noncarbonate				
Alkalinity (as $CaCO_3$)				
pH				
Specific conductance (micromhos at 25°C)				
Temperature (°F)				
Analysis No.				

Laboratory Data

LOCATION - ED10-10 EE1-1 EF378

Well No. W-6565 Sample range 10-407 No. of samples 80

No. of dupls. and cond. 75 Good Washed range 155-407 - 915

Samples prepared by Thomas, DeRoma Date 7/26/54 Finished 2/11/54 SF

Logged by NORTHUP Date MAY 1954

Correlations by _____ Date _____

MASTER CARD-A 9-26-69

STATE	COUNTY	LATITUDE DEG.	LATITUDE MIN.	LATITUDE SEC.	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	32	43	24	16	N	094	50	20	3

WELL SCHEDULE

US GEOLOGICAL SURVEY

IOWA DISTRICT WRD

WELL NO. 099-34W-10DACC CO. EMMET

OWNER ESTHERVILLE TOWN#6 ADDRESS ESTHERVILLE, IOWA

DRILLER THORPE WELL CO. DATE DRLD. AUG. 1954, DEEPENED APR. 1958

MAP 1:63,360 COUNTY HWY

SOURCE OF DATA FILE

DESCRIPTION M. P. LSD FEET (ABOVE) (BELOW) LSD 1282 FT

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
	2	099	34	W	10	DACC	06565	//	54CITY 6ESTHERVILLE IA	M	P	W	1	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.	DRAWDOWN (FEET)	ACCURACY	PUMPING PERIOD (HOURS)	QUALITY OF WATER IRON	SULF.	CHLOR.	HARD	SP. 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
	763	6	470	16	X	95	82	00	D		1282	7	113	D	45	58	1375		483			5	8	0	8	5	49	760	B

HYDROGEOLOGIC CARD - C

DUPLICATE CARD A CC 1-19	PHYS-IOG-RAPHY PROV.	PHYS-IOG-RAPHY SEC.	DRAINAGE BASIN	SUBBASIN	TOPO SETTING	MAJOR AQUIFER SYSTEM	SERIES USGS	SERIES IGS	UNIT	LITHOLOGY	ORIG.	THICKNESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	MINOR AQUIFER SYSTEM	SERIES USGS	SERIES IGS	UNIT	LITHOLOGY	ORIG.	THICKNESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	DEPTH TO CONSOLIDATED ROCK	SOURCE	DEPTH TO BASEMENT	SOURCE	SURF. MAT. LITHOLOGY	SURF. MAT. INFIL.	COEF. TRAN. SIG. FIG.	COEF. TRAN. XIO	COEF. STOR. SIG. FIG.	COEF. STOR. XIO-	GEOL. CARDS	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
	1	2	B	25	B	C	3	S	J	2	V	610	510	630	Ø	1	L	P	8D	6	100	100	530	155	C			8	T4						C

CASING AND SCREEN (SIZE, TYPE, INTERVALS):

16" CSG 0-287' 2"

12" CSG 237'-429'

10" CSG 379'-470'

THIS WELL ORIGINALLY DRILLED TO 917FT T.D. IN AUG. 1954. LATER IT FILLED WITH SAND AND WAS REPAIRED TO A NEW T.D. OF 762FT. (APRIL 1958) SEE SEQUENTIAL NO. 1 FOR DATA ON DEEPER WELL.

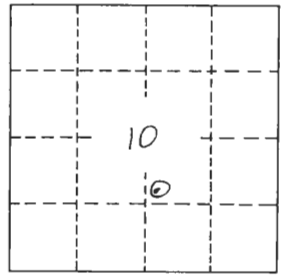
THE CITY OF ESTHERVILLE REFERS TO THIS WELL AS #5.

CODED BY D. AARONSON DATE 23 JAN. 1970

PUNCHED BY T DATE

VERIFIED BY DATE

SKETCH ON REVERSE: YES NO ✓



WELL NO 099-34W-10DACC

MASTER CARD-A 9-26-69

STATE	COUNTY	LATITUDE DEG.	LATITUDE MIN.	LATITUDE SEC.	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	32	43	24	16	N	094	50	20	1

WELL SCHEDULE

US GEOLOGICAL SURVEY

IOWA DISTRICT WRD

WELL NO. 099-34W-10DACC CO. EMMET

OWNER ESTHERVILLE TOWN #6 ADDRESS ESTHERVILLE, IOWA

DRILLER THORPE WELL CO. DATE DRLD. AUG. 1954

MAP 1:63,360 COUNTY HWY.

SOURCE OF DATA FILE

DESCRIPTION M. P. _____ LSD ____ FEET (ABOVE) (BELOW) LSD 1282

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
	2	099	34	W	10	DACC	06565	//54	CITY ESTHERVILLE IA	M	U	Z	2	I			C	I			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
	91	7	3	47	0	16	X	95	42	00	T	D5	1282	7	121	D	85	7	1250				5	8	0	8	5		456	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	INFIL.	COEF. TRAN. SIG. FIG.	XIO	COEF. STOR. SIG. FIG.	XIO-	GEOL. CARDS	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	25	B		C	3	5	5	2V	6	105	105	630	Ø	1	L	P	8D	6	100	100	530	155	C			8T	4							C

CASING AND SCREEN (SIZE, TYPE, INTERVALS):

16" CSG 0 - 287' 2"

12" CSG 237' - 429'

10" CSG 379' - 470'

WELL FILLED WITH SAND IN JAN. 1958. IT WAS PLACED BACK IN SERVICE APRIL 1958 - T.D. 763 FT. SEE SER#3 WELL SCHEDULE FOR DATA ON THIS WELL.

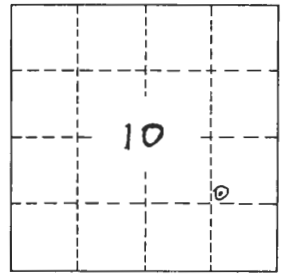
THE CITY OF ESTHERVILLE REFERS TO THIS WELL AS #5 IN MOST OF IT'S CORRESPONDENCE.

CODED BY D. AARONSON (P.S. HORICK 5/26/65) DATE 23 JAN. 1970

PUNCHED BY I DATE _____

VERIFIED BY _____ DATE _____

SKETCH ON REVERSE: YES _____ NO ✓



WELL NO. 099-34W-10DACC

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Local Well No. 099-34W-10DACC
Aquifer Code(s) C3SJ ØILP
Owner's Name ESTHERVILLE CITY #6
W Number 6565

Water Quality
(ppm)

Card Q

State: IOWA [19] (1 2) County: EMMET [32] (3 4) Town: ESTHERVILLE, IOWA

Well No. Latitude [4 3 2 4 1 6 N] (5–11) Longitude [0 9 4 5 0 2 0] (12–18) Seq. No. [3] (19) Date M D Y [0 7 1 5 6 0] (20–25)

Sampling Depth [7 6 3] (26–29) Type [1] (30) Kx10⁶ [1 6 3 0] (31–35) pH [7.0] (36–38) Temp. °F [4 9] (39–41)

SiO_2 [2 6.] (42–44) Ca [2 3 1.] (45–49) Mg [8 3.] (50–53) Na [5 3.] (54–58) K [6.7] (59–61)

HCO_3 [5 0 8] (62–65) CO_3 [0] (66 67) SO_4 [6 0 6.] (68–72) Cl [2.5] (73–78) Source No. [3] (79) [Q] (80)

Card R

Duplicate Columns 1-25 from Card Q

F [.4] (26–28) NO_3 [.4] (29–32) PO_4 [ ] (33–35) B [ ] (36–38) Al [ ] (39–41) Fe [1.6] (42–45)

Mn [.38] (46–49) Cu [ ] (50–52) Pb [ ] (53 54) Zn [ ] (55–57)

Solids Determined [1370] (58–63) Calc. [ ] (64–69) Hardness Ca,Mg [920] (70–73) Non-Carb. [504] (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 $CaCO_3$ [416] (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:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Local Well No. 099-34W-10DACC
Aquifer Code(s) C355 ØILP
Owner's Name ESTHERVILLE, IOWA
W Number 6565

Water Quality
(ppm)

Card Q

State: IOWA (19) (1 2) County: EMMET (32) (3 4) Town: ESTHERVILLE, IOWA

| | | |

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Local Well No. 099-34W-10.DACC
Aquifer Code(s) C3SJ Ø1LP
Owner's Name ESTHERVILLE, IOWA
W Number 6565

Water Quality
(ppm)

Card Q

State: IOWA [19] (1-2) County: EMMET [32] (3-4) Town: ESTHERVILLE, IOWA

Well No. Latitude [4324116N] (5-11) Longitude [094502O] (12-18) Seq. No. [1] (19) Date M D Y [070654] (20-25)

Sampling Depth [917] (26-29) Type [1] (30) Kx10^6 [1560] (31-35) pH [75] (36-38) Temp. °F [ ] (39-41)

SiO_2 [ ] (42-44) Ca [2211] (45-49) Mg [72] (50-53) Na [47] (54-58) K [7.3] (59-61)

HCO_3 [420] (62-65) CO_3 [0] (66-67) SO_4 [5562] (68-72) Cl [25] (73-78) Source No. [3] (79) [Q] (80)

Card R

Duplicate Columns 1-25 from Card Q

F [.4] (26-28) NO_3 [0.] (29-32) PO_4 [ ] (33-35) B [ ] (36-38) Al [ ] (39-41) Fe [1.2] (42-45)

Mn [.12] (46-49) Cu [ ] (50-52) Pb [ ] (53-54) Zn [ ] (55-57)

Solids Determined [1230] (58-63) Calc. [ ] (64-69) Hardness Ca,Mg [848] (70-73) Non-Carb. [504] (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 $CaCO_3$ [344] (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:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 099-34W-10DACC
Aquifer Code(s) C355 ØILP
Owner's Name ESTHERVILLE CITY 6 1954
W Number 6565

Card Q

State: IOWA (19) County: EMMET (32) Town: ESTHERVILLE, IOWA

Well No. Latitude 43241 6 N (5–11) Longitude 094502 0 (12–18) Seq. No. 1 (19) Date M D Y 04 04 56 (20–25)

Sampling Depth 917 (26–29) Type 1 (30) Kx10^6 1590 (31–35) pH 7.4 (36–38) Temp. °F (39–41)

SiO_2 26. (42–44) Ca 237. (45–49) Mg 68. (50–53) Na 50. (54–58) K 5.8 (59–61)

HCO_3 486 (62–65) CO_3 0 (66–67) SO_4 586. (68–72) Cl 50. (73–78) Source No. 3 (79) Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F .3 (26–28) NO_3 0. (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe 1.7 (42–45)

Mn .32 (46–49) Cu (50–52) Pb (53–54) Zn (55–57)

Solids Determined 1310 (58–63) Calc. (64–69) Hardness Ca,Mg 872 (70–73) Non-Carb. 474 (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 $CaCO_3$ 398 (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

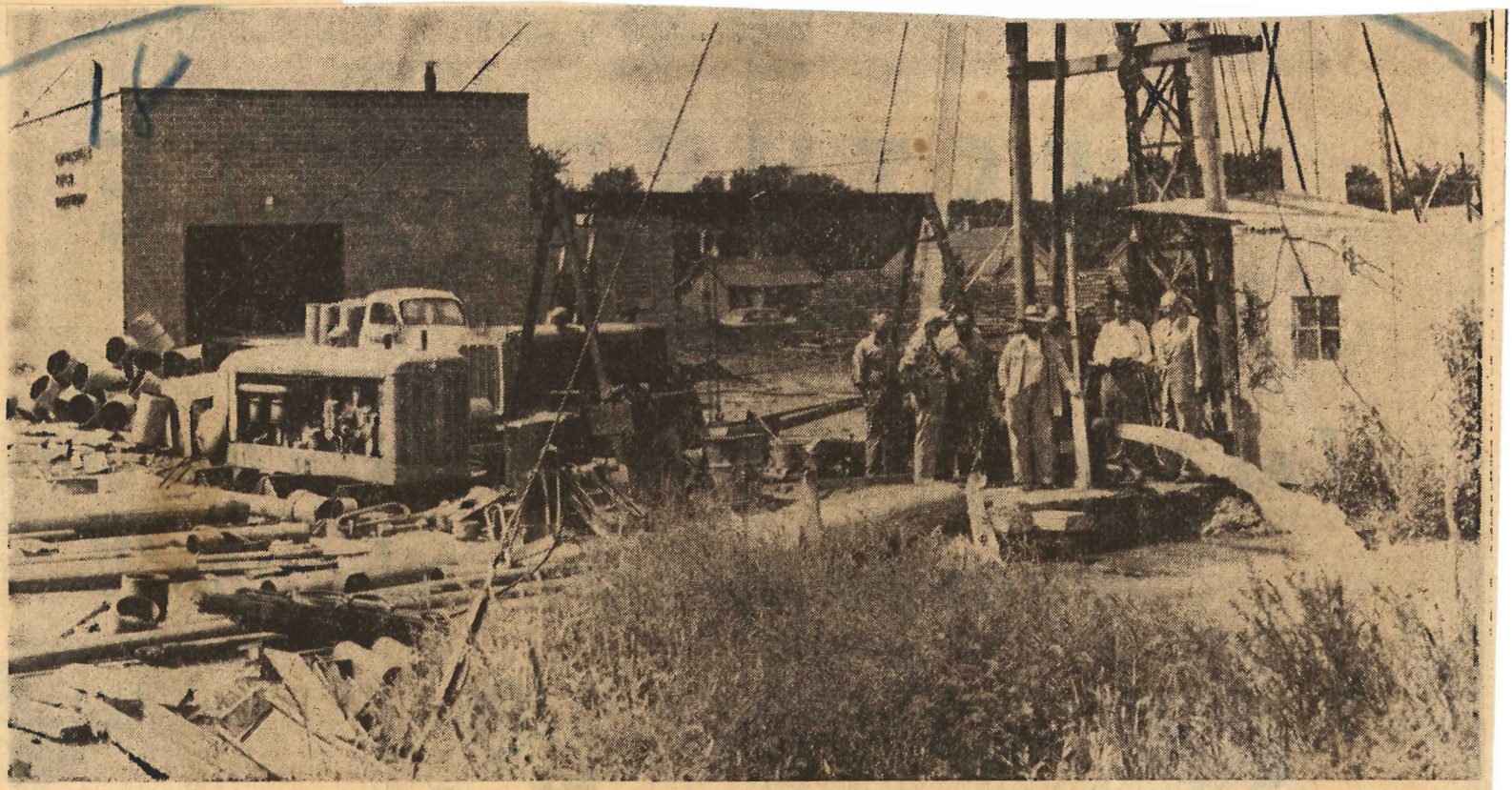
Punched by: T Date:

Published:

IOWA PRESS
CLIPPING BUREAU
Des Moines, Iowa

News
Estherville, Iowa

AUG 12 1954



(Daily News photo and engraving)

A CALCULATED RISK PAID OFF and city officials turned out to see it. City council members debated last May whether to move the Thorpe Well company equipment to a new location or drill deeper near the water treatment plant (at left). They decided on the latter course of action and found a plentiful source of water in the Jordan sandstone between 445 to 745 feet below the surface of the ground. The present "deep" city wells, located in the Dakota sandstone about 400 feet down, produce about 720 and 570 gallons per minute, according to tests conducted in 1952 by the Stanley Engineering company. The Thorpe company drilled down to 917 feet prospecting for water at the new well. The water, which seems to be as hard as that from other city wells, is clearer and does not have a taste or odor. The well will be pumping into the new water treatment plant as soon as additional pumping equipment is purchased, Supt. of Public Works Larry Madden said. The new well develops a new water supply for the entire area, W. T. Thorpe, president of the well company said. Studies made while drilling No. 5 will be invaluable in drilling future wells for they reveal the strata of earth in this area.

THREE GENERATIONS OF UNINTERRUPTED SERVICE

THORPE WELL COMPANY

T. W. THORPE, PRESIDENT
J. WESLEY THORPE, VICE PRES.
TOM C. THORPE, VICE PRES.



We dig for our business

WELL DRILLING CONTRACTORS - ALL TYPES OF WELLS • SALES AND SERVICE OF PUMPING EQUIPMENT

TELEPHONE 3-6107

2340 SIXTH AVENUE
DES MOINES 13, IOWA

June 30, 1954

Dr. H. Garland Hershey
Director and State Geologist
Iowa Geological Survey
Iowa City, Iowa

Dear Sir:

We are forwarding to you some cutting samples which we have taken from our job at Estherville, Iowa and would appreciate receiving an early report from you on the analysis of said samples.

Thanking you in advance, we are

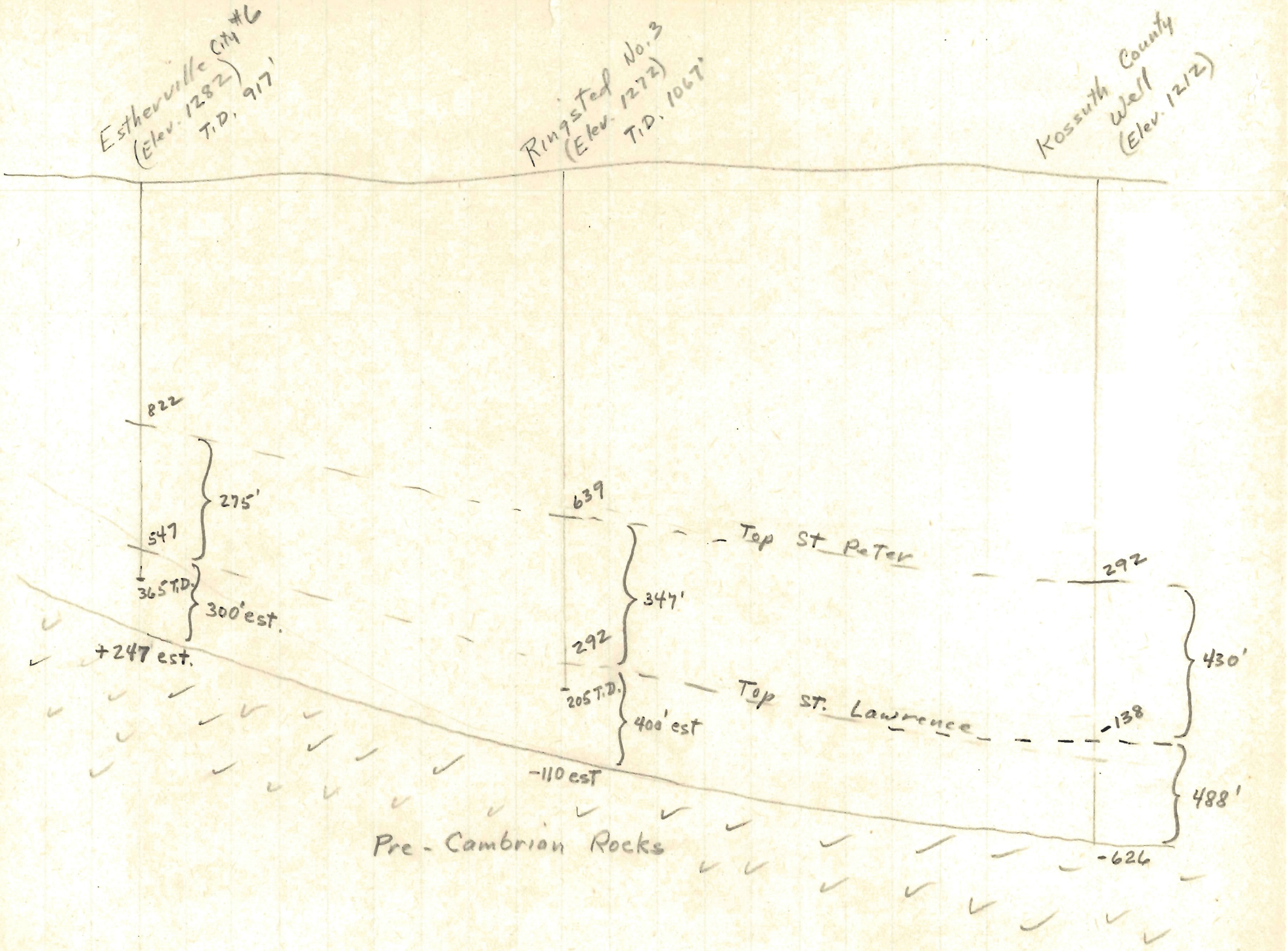
Very truly yours,

THORPE WELL COMPANY

Carl Allen

Carl Allen, Foreman
Construction Department

CA/blt



Forecast for Pre € at Estherville.

PJ Heick 1954

July 2, 1954

4

Emmet

MEMORANDUM

To: H. G. Hershey
From: R. C. Northup
Subject: Estherville City Well

Samples from the new well being drilled by Thorpe Well Co. at Estherville have been received and studied to a depth of 885'. Formation tops have been picked as follows:

Pleistocene	0-155'	
Cretaceous	155-405	(includes Dakota sandstone 295-405')
Decorah-Platteville	405-450	
St. Peter	450-530	
Prairie du Chien	530-650±	
Jordan	650-735	
St. Lawrence and Franconia	735-885	

This well correlates very well with the Ringsted Town well down to the Root Valley sandstone member of the Prairie du Chien, but below there the sections are different. The bottom member of the Prairie du Chien, the Oneota dolomite, is apparently absent at Estherville. This could be accounted for by non-deposition or possibly by channelling, with the Oneota removed by stream action and being filled with overlying Root Valley sand. As this sand is so similar to the Jordan, the boundary is somewhat difficult to place. On the basis of the Ringsted well, the writer has placed the top of the Jordan at about 650'. Contact between the Jordan and underlying St. Lawrence dolomite is somewhat transitional with the lowermost part of the Jordan containing sandy dolomite and the upper few feet of the St. Lawrence containing dolomitic sandstone. Top of the Franconia was picked on the heavy increase in Glauconite. The section was becoming very shaly at 870'. This shale may be in the Franconia or possibly in the underlying Eau Claire.

Due to the lack of control in this part of the State, it is somewhat of a guess as to the depth to the Pre-Cambrian. On the basis of the Algona City well, the Pre-Cambrian will be reached in no more than 300 feet of further drilling; but as the section has probably thinned, the basement complex may well be reached much sooner.

Samples on this well have been excellent and apparently saved and collected carefully, and not likely that unrepresentative cuttings have been sent to us.

Emmet

July 13, 1954

Thorpe Well Company
2340 Sixth Avenue
Des Moines, Iowa

Attention Mr. Carl Allen

Gentlemen:

A study of the samples from the Estherville well to a depth of 885 feet results in the following log:

Pleistocene	0-155 feet
Cretaceous	155-405
)includes Dakota sandstone	295-405')
Decorah-Platteville	405-450
St. Peter	450-530
Prairie du Chien	530-650±
Jordan	650-735
St. Lawrence and Franconia	735-885

This well correlates very well with others in northwestern Iowa as far as the Root Valley sandstone member of the Prairie du Chien, but below that there are differences. The bottom member of the Praidie du Chien, the Oneota dolomite, is apparently absent at Estherville. This could be accounted for by non-deposition or possibly by channelling, with the Oneota removed by stream action and being filled with overlying Root Valley sand. As this sand is so similar to the Jordan, the boundary is somewhat difficult to place, but has been set at about 650 feet. The contact between the Jordan and the underlying St. Lawrence is transitional with the lowermost part of the Jordan containing sandy dolomite and the upper few feet of the St. Lawrence dolomitic sandstone.

Due to the lack of control in this part of the State, it is difficult to forecast the top of the Pre-Cambrian "granite" with assurance. On the basis of the best information we have at hand, it appears that 300 additional feet of drilling should reach the Pre-Cambrian. However,

since there has been some thinning of other higher beds, it is entirely possible that the basement complex may be reached much sooner.

Samples from this well have been excellent, and we appreciate your fine cooperation in furnishing them. If there is anything additional that we can do, please let me know.

Very truly yours,

H. G. Hershey

HGH:t

Copy sent to Harry Lewis Water Well Co.

Estherville (Emmet)

October 7, 1954

Description of Samples to Accompany
Estherville Well No. W-6565 Log

10'-50'	Till:	gray, unoxidized, unleached
50'-60'	Till:	yellow, oxidized, unleached
60'-85'	Till:	as above, pebbly
85'-90'	Till:	mixed yellow, becoming gray unoxidized, pebbly
90'-95'	Till:	dark gray, pebbly, slightly calcareous
95'-105'	Till:	gray, slightly calcareous
105'-145'	Till:	gray, unoxidized, unleached calcareous
145'-155'	Till:	yellow, oxidized, unleached
155'-160'	Shale:	medium gray, silty, some siderite nodules
160'-165'	Shale:	dark gray, laminated
165'-170'	Shale:	medium gray, silty
170'-175'	Shale:	dark gray, silty
175'-185'	Shale:	medium gray
185'-190'	Shale:	black, laminated
190'-195'	Shale:	light gray
195'-200'	Shale:	light gray, slightly silty, laminated
200'-205'	Shale:	light and medium gray, slightly silty, laminated
205'-215'	Shale:	medium gray, silty
215'-225'	Shale:	light gray, silty, few siderite nodules
225'-230'	Shale:	light gray, silty
230'-270'	Shale:	medium gray, laminated, micaceous, slightly silty
270'-275'	Shale:	as above trace siderite
275'-295'	Shale:	medium gray, laminated, micaceous, slightly silty
295'-305'	Sandstone:	light gray, coarse to fine, mostly fine, siderite nodules
305'-310'	Sandstone:	as above, Shale: medium gray laminated, much siderite
310'-320'	Sandstone:	light gray coarse to medium, angular to subangular
320'-325'	Sandstone:	light gray medium to fine, angular to subangular
325'-330'	Sandstone:	as above, much siderite
330'-335'	Sandstone:	light gray, few yellow and pink grains, medium, angular to subangular, trace siderite
335'-345'	Sandstone:	light gray, few yellow and pink grains, coarse to medium, angular to subangular
345'-350'	Sandstone:	light gray, plus yellow, very coarse, angular to subangular few round, polished, may be partly Pleistocene cave
350'-355'	Sandstone:	light gray plus yellow, coarse to fine
355'-360'	Sandstone:	light gray, fine, angular to subangular, well sorted

360'-375'	Sandstone:	light gray, few yellow grains, medium to fine, angular to subangular
375'-395'	Sandstone:	few yellow grains, coarse to fine, angular to subangular
395'-405'	Gravel:	medium to fine, subangular; sandstone; light gray plus yellow, coarse angular to subangular, sample may be partly Pleistocene cave
405'-420'	Shale:	green, lumpy, non calcareous, few rounded sand grains, light gray
420'-425'	Shale:	as above, Sandstone; light gray, fine pyritiferous
425'-430'	Shale:	dark green plus dark brown
430'-435'	Limestone:	light gray, very fine, fossiliferous
435'-440'	Dolomite:	light gray, fine saccharoidal; limestone, light gray, very fine; fossiliferous; shale: gray, laminated.
440'-450'	Sandstone:	light gray, medium to fine, very pyritiferous; shale; green sandy
450'-460'	Sandstone:	light gray, medium, subrounded to rounded, curvilinear, frosted, well sorted; shale: as above
460'-465'	Shale:	dark green, brown, lumpy; sandstone as above
465'-485'	Sandstone:	light gray, medium, subrounded to rounded, curvilinear, frosted, well sorted
485'-490'	Sandstone:	light gray, medium to fine, subrounded to rounded, curvilinear, frosted, well sorted
490'-510'	Sandstone:	light gray, medium, subrounded to rounded, curvilinear, frosted, well sorted
510'-515'	Sandstone:	light gray, medium to fine, subrounded to rounded, curvilinear, frosted, well sorted
515'-520'	Sandstone:	light gray, coarse to medium, mostly medium, subrounded to rounded, curvilinear, frosted
520'-530'	Sandstone:	light gray, medium to fine, subrounded to rounded, curvilinear, frosted, well sorted
530'-540'	Chert:	light gray, smooth, oolitic; dolomite tan, light gray, sandy; sandstone; light gray coarse to fine, angular to subrounded frosted
540'-550'	Chert:	as above, dolomite: tan, fine, very sandy; sandstones as above
550'-560'	Dolomite:	light brown plus light gray, fine sandy, some oolitic, sandstone light gray, coarse to medium, rounded to subrounded, curvilinear, frosted

560'-565'	Dolomite:	light gray, fine, very sandy; sandstone; light gray, medium, rounded frosted
565'-575'	Dolomite:	light gray, fine, sandy; sandstone; light gray, medium rounded, frosted
575'-585'	Dolomite:	light gray, fine, slightly sandy; sandstone; as above
585'-590'	Dolomite:	light gray, cream, medium to fine, slightly sandy
590'-595'	Dolomite:	cream tan, medium to fine
595'-600'	Dolomite:	tan, fine; sandstone; light gray, medium rounded, frosted
600'-615'	Dolomite:	tan, fine, sandy sandstone; light gray, medium to fine subrounded to rounded, frosted
615'-630'	Dolomite:	tan, light gray, very sandy, sandstone; light gray, coarse to fine, subrounded to rounded, curvilinear
630'-635'	Sandstone:	light gray and amber, coarse to fine, rounded, few subrounded, curvilinear, frosted
635'-645'	Sandstone:	light gray, medium to fine, rounded to subrounded, curvilinear, frosted mostly fine
645'-650'	Sandstone:	light gray, medium to fine, rounded to subrounded, curvilinear, frosted
650'-660'	Sandstone:	light gray plus amber, coarse to fine, subrounded to rounded, curvilinear, frosted
660'-665'	Sandstone:	light gray, fine, few coarse grains, slightly iron stained
665'-670'	Sandstone:	light gray plus amber, coarse to fine, frosted, rounded curvilinear, dolomitic
670'-675'	Sandstone:	light gray, coarse to fine, mostly fine, rounded to rounded
675'-680'	Sandstone:	light gray fine
680'-685'	Dolomite:	tan, fine, very sandy; sandstone, light gray, coarse to fine, rounded to subrounded
685'-690'	Dolomite:	as above; sandstone: light gray, coarse to fine, mostly fine, rounded to subrounded
690'-700'	Sandstone:	light gray plus amber, coarse to fine, some dolomitic cement
700'-705'	Sandstone:	light gray, fine, free
705'-710'	Sandstone:	light gray, coarse to fine, free, rounded to subrounded plus light gray, fine, dolomitic cement
710'-725'	Sandstone:	as above, mostly fine with dolomitic cement
725'-730'	Dolomite:	light gray, fine, very sandy; sandstone: as above; shale: light gray, lumpy
730'-740'	Dolomite:	light gray, fine, very sandy; sandstone; light gray, fine, dolomitic

740'-750'	Dolomite:	light gray, grayish tan, medium to fine, (mostly fine), sandy
750'-755'	Dolomite:	light gray, grayish tan, fine
755'-760'	Dolomite:	light gray, and tan, fine and slightly glauconitic, sandstone light gray, coarse, rounded (may be cave)
760'-765'	Dolomite:	light gray and tan, medium to fine, very glauconitic; sandstone: as above
765'-770'	Dolomite:	light gray and cream, fine, sandy, very glauconitic
770'-775'	Dolomite:	light gray and cream, fine, glauconitic; sandstone; light gray, fine
775'-780'	Dolomite:	light gray; sandstone, light gray, fine glauconitic globs and pellets
780'-785'	Dolomite:	light gray, fine, sandy, very glauconitic; sandstone; as above
785'-795'	Dolomite:	light gray, cream, fine, sandy, very glauconitic
795'-800'	Dolomite:	as above; sandstone; light gray and glauconitic; trace shale; light gray, flakey
800'-815'	Dolomite:	light gray, cream, fine, sandy, very glauconitic; shale: light gray, lumpy
815'-825'	Dolomite:	light gray plus blue, fine, sandy, very glauconitic; sandstone: very glauconitic, light gray, fine
825'-830'	Dolomite:	as above; sandstone: as above; shale: light gray, flakey
830'-845'	Dolomite:	cream, fine, very sandy; sandstone; gray, fine dolomitic
845'-860'	Dolomite and Sandstone:	as above; shale: green, lumpy
860'-870'	Sandstone:	light gray, fine, dolomitic, very glauconitic; shale: grayish green, laminated
870'-875'	Shale:	grayish green, laminated
875'-880'	Sandstone:	light gray, fine, dolomitic; shale; as above
880'-885'	Shale:	grayish green, laminated
885'-895'	Dolomite:	cream, fine, very glauconitic; shale; light green, laminated
895'-905'	Dolomite:	as above; sandstone; light gray, fine; shale: light green, laminated, flakey
905'-917'	Sandstone:	light gray, fine, glauconitic; shale; as above

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

Well Log Record

Well name and number City of Esterville Well #6 Town Esterville County Emmet

Owner of well _____ Address _____

Tenant _____ Address _____

Location _____ sec. ____, T. ____ N., R. ____ E. W. _____ Twp.

Curb elevation _____ ft. Present depth _____ ft. final depth 917 ft.

Static level: (Depth to water above below curb) _____ ft. Pumping level ____ ft. at ____ g.m.

Contractor _____ Date drilled _____

Description*	FEET			Description*	FEET		
	Thick	From	To		Thick	From	To
Surface, Sand + Gravel	9'6"	0	9'6"	sdst. hard, Sh streaks	12	294	306
Blue Clay	12'6"	9'6"	22'	Sdst, hard Sh streaks	8	306	314
Gray Clay, Sandy	28'	22'	50'	Sdst, softer Sh or Clay	3	314	317
Yellow Clay, Sandy	35'	50'	85'	Fine sdst hard	23	317	340
Bl. Green Sandy Clay	20'	85	105'	Fine Sdst Soft	5	340	345
Sandy Gray Clay	60'	105'	165	Coarse Sdst Soft	5	345	350
Black Shale	2'	165'	167'	Fine Sdst soft	4	350	354
Brown Shale	6'	167'	173'	Sandstone Soft	4	354	395
Gray brown Shale	22'	173	195	Sandstone Coarse, Hard	12	395	407
Gray Shale	99'	195	294'	Green Blue shale	9	407	416

*Abbreviate descriptions: use one line for each formation (over)

Remarks on water zones and casings 175' of 24" Pipe Depth to bottom of Pipe 178' to top of Pipe 2'. 335 1/4 of 16" Pipe. 334' to bottom of Pipe. 1'4" to top of Pipe. Pipe Steel

Temperature: Air _____ °F., Water _____ °F. at A.M. P.M. _____ 19__

Record obtained from Larry Madden City Engr. Recorded by _____

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

Well Log Record

Well name and number _____ Town _____ County _____

Owner of well _____ Address _____

Tenant _____ Address _____

Location _____ sec. ____, T. ____ N., R. ____ E. W. _____ Twp.

Curb elevation _____ ft. Present depth _____ ft. final depth _____ ft.

Static level: (Depth to water above below curb) _____ ft. Pumping level ____ ft. at ____ g.m.

Contractor _____ Date drilled _____

Description*	FEET			Description*	FEET		
	Thick.	From	To		Thick	From	To
Green Shale	14	416	430				
Brown Shale	5	430	435				
Brown Lime & Shale	10	435	445				
St. Peter Sdst	105	445	550				
Lmst. Gray & White	4	550	59				
Lmst. Sandy Gray & Br.	14	591	605				
Lmst. Sandy Brown	25	605	630				
Jordan Sd St. Wh.	115	630	745				
Lmst. Gray	9	745	754				
Green Sh. Streaks Lime + Sd	163	754	917				

*Abbreviate descriptions: use one line for each formation

Remarks on water zones and casings _____

Temperature: Air _____ °F., Water _____ °F. at A.M. P.M. _____ 19__

Record obtained from Larry Madden City Engr Recorded by _____

Town well

Estherville log, below Dakota, as reported by Tom Thorpe on telephone 6-3-54.

This well is supposed to be test pumped, Monday, June 7, 1954

JBC

noted Hgt.

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

Well Log Record

Well name and number Estherville City #6 (1954) Town Estherville County Emmet

Owner of well → Address

Tenant Address

Location SW NE SE sec. 10, T. 99 N., R. 34 W. Twp.

Curb elevation ft. Present depth 550 ft. final depth 917 ft.

Static level: (Depth to water above/below curb) ft. Pumping level ft. at g.m.

Contractor Thorpe Well Co. Date drilled May 1954

Description*	FEET Thick	From	To	Description*	FEET Thick	From	To
Green Shale	23	407	430				
Brown "	5	430	435				
Ls. & Shale	10	435	445				
Coarse White Sand	105	445	550				

*Abbreviate descriptions: use one line for each formation

Remarks on water zones and casings 10" liner to top of sand/gravel 60' ± into 12" (12" set?) Well bailed for 30 Min. at 76 gpm Swl 105' when Pmp at 490 and Swl raised to 118'
125' 535
126' 550

Temperature: Air °F., Water °F. at A.M. P.M. 19

Record obtained from Tom Thorpe Jr. Recorded by SB Cooper

June 3, 1954

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa
WELL OR WATER SAMPLE DATA

Bottle No._____

I.G.S. Well No._____

TOWN ESTHERVILLE COUNTY EMMET

LOCATION SW-NE-SE sec. 10 T. 99 N., R. 34 W. E. ESTHERVILLE Twp.

OWNER OF WELL CITY OF ESTHERVILLE WELL NO. 6

USE OF WATER: Municipal supply(X); Private-domestic( ); Public drinking( ); Livestock( ); Industrial( ); School supply( ); Air conditioning( ); Cooling( );
_____( ).

CONSTRUCTION OF WELL: Drilled: Cable tool(X), Rotary( ); Gravel-pack type( ); Driven( ); Dug( ); Bored( ); Jetted( );_____( ).

CONTRACTOR THORPE WELL CO DATE STARTED OCT 53
DATE FINISHED AUG 18, 1954

CASING OR CURBING DATA: (Show by diagram on opposite side of sheet the kind, length and depth of top and bottom of each size of pipe, the amount of overlaps, position of seals or packers, pipe perforation and screens, etc.)

WELL DATA

Curb Elevation_____Ft. Present Depth_____Ft. Final Depth 747 Ft.

Ground Elevation_____Ft. Topographic Position_____

Static Level (Depth to water (above) (below) curb) 130' AUG 12, 1959 Ft. Pumping Level 149' JUN 27, 1959 Ft.

Amount of Drawdown_____Ft. pumping at 920 g.p.m. in____hrs._____minutes.

Specific Capacity_____g.p.m. per ft. drawdown in_____hours.

Type of Pump TURBINE Power ELEC

Depth of Bottom of Pump 200 ft. with 0 ft. of suction pipe.

TEMPERATURE: Air____°F.; Water 50 °F., measured after well had pumped 8 hours and _____mins. at 800 g.p.m.; 75 ft. from pump after water had passed through the following pipe IRON Time 8 (A.M.) ~~(P.M.)~~

SOURCE OF WATER:

Principal producing formation JORDAN-ST LAWRENCE 630 ft. to 747 ft.

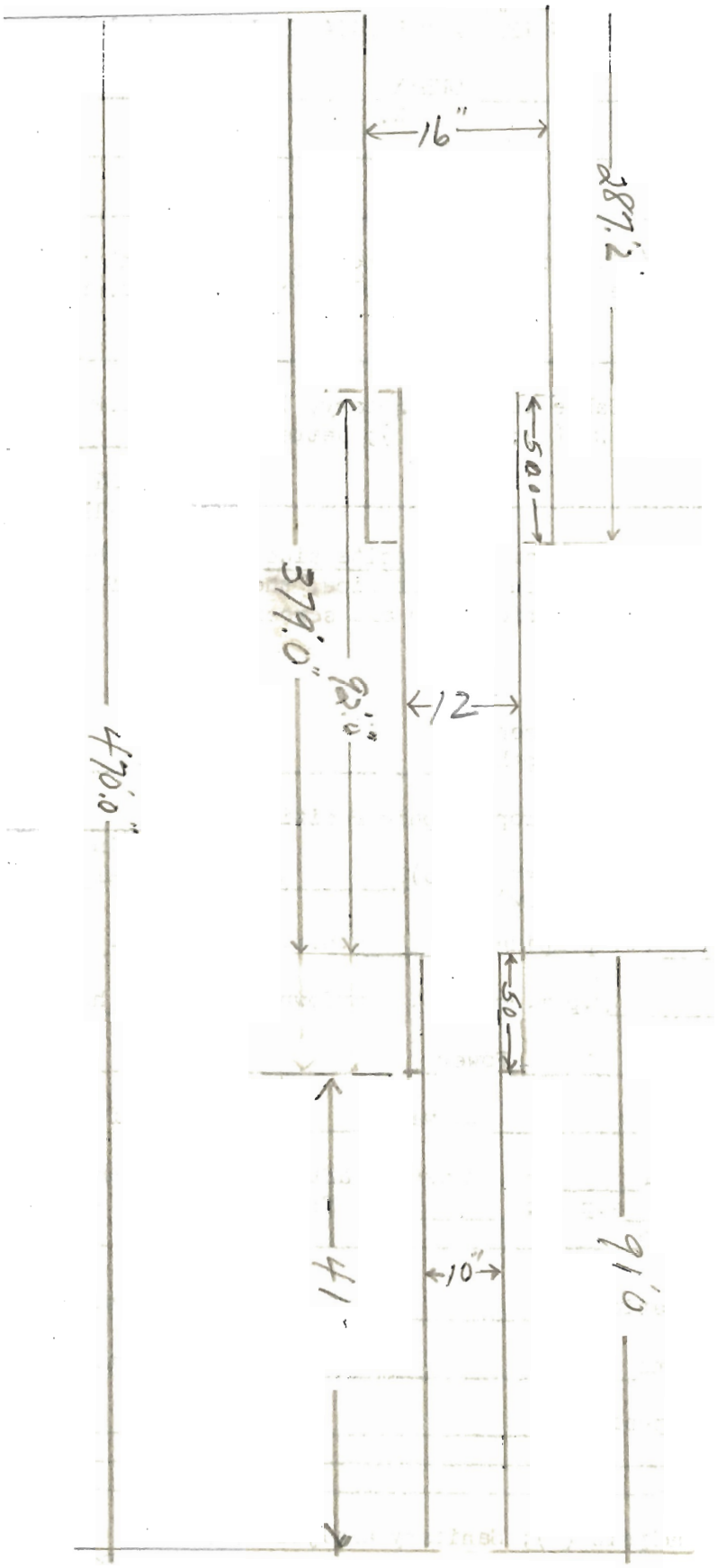
Other producing formations ST PETER-PRAIRIE DU CHIEN 470 ft. to 630 ft.

REMARKS: (Taste, odor, and appearance) CLEAN No No

Sample taken for: Mineral analysis ( ); Sanitary analysis ( ). RADIOLOGICAL
Data collected by LLStoele Date 5-26-60

Copies to: LESTER S. DLES WATER SUPT

AUG 12, 1959
SWL 130.6



WELL FILLED UP TO
747.0" - 1-8-58

APR 7, 1958
SWL 113'10"

MAY 12 1958
PWL 136

JUL 2 1958
PWL 141

AUG 4, 1958
PWL 143

JUN 25, 1959
PWL 155.6

JUN 27 1959
@9:20 AM PWL 149
PUMP SET
AT 200'

APR 7, 1955
SWL 109.6

JAN 8, 1958
SWL 118

SEP 15, 1955
PWL 161

NOV 2 1955
PWL 160.6

JUNE 15 1956
PWL 165

DEC 4 1956
PWL 158

MAR 7 1957
PWL 152

AUG 10 1957
SWL 121

AUG 12 1957
PWL 159.6

PUMP TEST RECORD

THORPE WELL COMPANY, 2340 SIXTH AVENUE, DES MOINES, IOWA

For City Located at Estherville, Iowa

Make, Kind and Size of Power

Make of Pump Head Used Number

Number and Size of Bowls Used

Setting of Pump Bowls 200 Size and Depth of Well

Static Head Before Pumping (Tape Measurements) After Pumping 115'-2" 8:00 A. M. 4-2-38

Temperature of Water (Before Testing) (At End of Test After Hours)

DATE	TIME	ENGINE R.P.M.	PUMP R.P.M.	PUMPING HEAD	GALLONS PER MIN.	RECOVERY FROM	RECOVERY TO	MINUTES
April 1	4:00 AM			128½	500			
April 1	8:30			128½	500			
shut down	9:30		orifice	132-6	838		118'	30
	10:00			145	1135			
	10:30			145	1135			
shut down started	12:10							
	12.40			148-4	1090			
run 10 min. at	1:10			148-4	1090			
run 25 min.				150-6	1200	Motor Kicked out		
run 50 min.				150	1120	Motor Kicked out		
Kicked out				150	1020	Motor Kicked out		
					1100			
				149	1060			
	4:00			148	1060 X			
	5:00			148-5	1000			
	6:00			147-11	1000			
	7:00			148-6	996			
	8:00			149-3	996			
	9:00			149-10	996			
	10:00			149-11	996			
	11:00			149-11	996			
	12:00			150	996			

PUMP TEST RECORD

THORPE WELL COMPANY, 2340 SIXTH AVENUE, DES MOINES, IOWA

For City Located at Sutherville, Iowa

Make, Kind and Size of Power City-Pump

Make of Pump Head Used Number

Number and Size of Bowls Used

Setting of Pump Bowls 200' Size and Depth of Well

Static Head Before Pumping 113'-10" After Pumping
(Tape Measurements)

Temperature of Water 49°
(Before Testing) (At End of Test After Hours)

DATE	TIME	ENGINE R.P.M.	PUMP R.P.M.	PUMPING HEAD	GALLONS PER MIN.	RECOVERY FROM	RECOVERY TO	MINUTES
April 7	2:00 PM			134'	980			
	3:00 PM			137'-8"	967			
	3:30 PM			139	961			100 Amps
lowered bowls 11 turns	4:00				1110			105 Amps
	4:45			143-5	1105			
	5:15			144-2	1105			
lowered bowls	6:00			145	1100			
	6:30	turn off bottom						
	7:00			159	1375			121 Amps
	8:00			160-9	1375			
April 8	4:00 AM	start pump						
	4:30			154	1375			
	5:00			157	1375			
	6:00			159	1350			
	7:00			160-3	1375			
	8:00 AM			161-5	1375			

April 21, 1958

Mr. George W. Otto
Supt. of Public Works
Estherville, Iowa

Dear Mr. Otto:

The record of the repair work on Esterville city well No. 5 is a valuable addition to our files and we want to thank you for this information. Apparently the work was successful and we hope you have no further problems with No. 5.

Please let me know if I can be of assistance.

Very truly yours,

H. G. Hershey

CNB:dh

CITY OF ESTHERVILLE

APR 16 1958

ESTHERVILLE, IOWA

Leo I. Sanders.....Mayor
Glenn L. Story.....City Clerk
George W. Otto.....Supt. of Public Works
F.E. Rosendahl....City Attorney
Mrs. Arlene Wee..City Treasurer



CITY COUNCIL
Ray S. Rhodes
O. C. Gibson
C. R. Hedrick
Jack B. White
Arthur B. Irwin
K. L. Kautz

April 15, 1958

Dr. H. G. Hershey
Director & State Geologist
Iowa Geological Survey
Geology Annex
Iowa City, Iowa

(IGS W-6565)

Re: Number 5 Well, Estherville, Iowa

Dear Dr. Hershey:

In view of the fact that our number 5 well started pumping considerable sand on January 5, 1958, it was necessary for us to repair this well.

The repair was made by shooting the well at the following depths:

Dynamite Charge	Depth of Shot
50 pounds	740 feet
100 pounds	720 feet
125 pounds	700 feet
125 pounds	680 feet
125 pounds	660 feet
125 pounds	640 feet
125 pounds	620 feet
125 pounds	540 feet
62½ pounds	530 feet
62½ pounds	520 feet

The cavity filled to 488 feet and the sand was removed by use of an air injector on a 5 inch columm pipe.

After the sand and rocks were removed the well was test pumped up to 1,200 gallons per minute which pulled in more sand that blocked off the well just below the Saint Peter Sandstone. The sand was again removed to the depth of 763 feet and another pump test made.

The second and last pump test was made up to 1,375 gallons per minute which indicated from the draw down that the hole was open all the way down, therefore, we installed the pump and started to use the well on April 12, 1958.

I am enclosing the pump tests for your records. Should you have any further questions regarding this well please feel free to refer them to me.

Yours truly,

Geo. W. Otto

George W. Otto
Supt. of Public Works
Estherville, Iowa

GWO:lav

Enclosure (2)

GW Estherville city well 6
folder
Emmet Co.

INVENTORY OF VISITORS

Name Orion Atchinson Date March 17, 1969
March 18, 1969

Affiliation Thorpe Well Co.

Address Des Moines

Information Requested Estherville City Well #6 is pumping sand. Thorpe has been called to repair or recondition well. A sample of the sand is to be mailed special delivery to-day and I am to call Mr. Atchinson collect when I have looked at the sample.

Information Obtained at Survey Office On March 18, the sample arrived, both Don Koch and I examined the sample. It appears to be from the lower Cretaceous logged between 330 and 410 feet. This information was called to Mr. Atchinson

Phone Call X Visit _____

Mary C. Parker
Survey Contact