

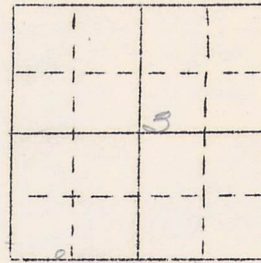
IOWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey

W-0700

RECORD OF WELL

Location:

Town: Grafton (N E)
(S W); County North
SE-SW-SE sec. 3 T. 98 N., R. 19 W. Union Twp.



Well name and number Town Well

Owner _____ Address _____

Tenant _____ Address _____

Contractor Thorpe Well Co. Address Des Moines

Drillers _____

Drilling dates Dec. 13/1937 - Jan. 9/1938

Well data:

Elevations: Drilling curb 1225 feet; Land surface _____ feet

Determined by _____

Topographic position Upland plain

Total depth: Reported _____ feet, Measured 172 1/2 feet

Drilling method _____

Hole and casing data 72 1/2' of 12" casing from +2 1/2' to 70' ; 12' open hole 70-90.
(Give amount, size, kind, and depth of all casing; type and
8" open hole 90-172 1/2'
position of seals and packers; cementing; how finished--perforated pipe, screen,
gravel pack, open hole, etc.)

Original depth to water _____ above
ft. below _____ Date _____

Original elevation of water level _____ ft.; Source of data _____

Sources of water: Principal Devonian-Cedar Valley; Others Shellrock

Production data: _____ Date _____
 Static depth to water 41' 7 1/2" Measuring point _____
 Pumping level 46' 8" at 46.2 g.p.m.

Specific capacity 9.2 g.p.m. per ft. drawdown; Temperature 47 °F.

Pump data; Type pump Turbine Column Dia. _____ Length 88'
 Cylinder or bowls: Dia. 5 3/4" Length 125 Suction pipe 23 1/2"
 Power Electricity Airline _____
 Estimated rate of production: _____ g.p.m. for _____ hrs. a day
 Use of water City supply

WATER ANALYSES (in parts per million)

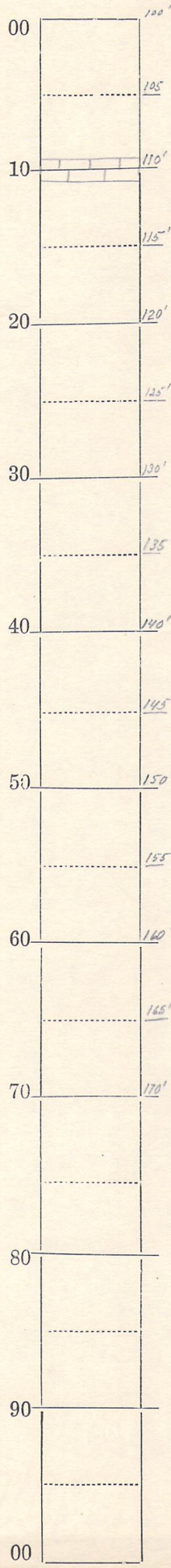
Date sampled	<u>Jan 29, 1938</u>	_____	_____	_____
Sampled by	<u>H. G. Hershey</u>	_____	_____	_____
Total solids	<u>546</u>	_____	_____	_____
Insoluble matter	<u>13.6</u>	_____	_____	_____
Alkalinity (Meo)	<u>256.0</u>	_____	_____	_____
Alkalinity (Phn)	<u>0.0</u>	_____	_____	_____
pH	<u>7.0</u>	_____	_____	_____
Fe ₂ O ₃ + Mn ₂ O ₃ + Al ₂ O ₃	_____	_____	_____	_____
Alkali as sodium	_____	_____	_____	_____
Calcium	<u>76.4</u>	_____	_____	_____
Magnesium	<u>22.5</u>	_____	_____	_____
Iron (unfiltered)	<u>1.4</u>	_____	_____	_____
Manganese	<u>0.15</u>	_____	_____	_____
Nitrate	_____	_____	_____	_____
Fluoride	_____	_____	_____	_____
Chloride	<u>11.0</u>	_____	_____	_____
Sulfate	<u>16.4</u>	_____	_____	_____
Bicarbonate	<u>312.3</u>	_____	_____	_____
Hardness (ppm)	<u>287.0</u>	_____	_____	_____
Hardness (gpg)	<u>16.8</u>	_____	_____	_____
Remarks	_____	_____	_____	_____

Laboratory data: _____ Sample storage location _____
 Sample range 0-170 No. spls. 23 No. dupls. & cond. 30 7-8
 Spls. prepared by _____ Washed range _____ by _____
 Driller's log and cond. _____
 Insoluble residues: Prepared by _____ Studied by _____ Strip log _____
 Microscopic study 0-170 strip log May 42, Carson
 Gen. log yes Correl. by Carson

Union Twp.

00	3'	Top Soil, lt. drab., silty textured clay with granules & small pebbles of qz, wh. dol, iq mat, etc.
	5'	Till, sandy, clayey silt drab to limonite yellow, sand, coarse gr. ang., pebbly (qz, wh. dol, iq, rock frag., cinder frag, etc.). Just enough clay is present to form a binder. med. amt. mica pres.
10	10'	Till sim. to spl. 3-5' in part and in part a harder, more fine gr. dense, slightly unctuous, silt or clay, lt. drab, non calc., non micaceous, (40%).
	15'	Till, sim. to spl. 5-10' in color, text. & approx comp. 11% frag. drk iq. (rounded),
	20'	Till, sim. to spl. 5-10' in color & text, but more pebbly, about 7% 1 frag. drk. iq. rock 1/4 cm. in diam.
20	25'	Till, sim. to spl. 5-10' in color, text, & approx. comp; 40% of fine drab. clay; occasional cinder fragments.
	30'	Till, sim to spl. 5-10' in color, but at least 80% of dense drab clay. 5 or 6 frag. ranging from 1/2-1 mm. in diam. (drk. iq, qz, wh. dolomite.
30	35'	Till, clay colored (limonite yel.), sandy, claybound silt, non calc. sand coarse, maj. gr. 1-1/2, prin. subs 2-3 + 1/2-1/4, ang., one frag. show. Wine red color of oxidation (?). Numerous granules of trash & waste gr. qz, feld. & drk. iq. rock. At least 25% of mat. is sd. & pebbles.
	40'	Till, clay colored, sim. to spl. 30-35' in color, text, & comp; fewer pebbles.
40	45'	(?) or silt
	47 1/2'	Till, clay colored, sim to spl. 30-35' in color, & text; practically no clay; 20% of pebbles upto 2 cm. in diam.
	49 1/2'	Till (?) or silt, clay colored, sim. to spl. 30-35' but no clay, calc. (med. efferv.), 2%
50	50'	Sand, & granules, K crs. (Maj. gr. 2-1 mm, prin. sub. 4-2 + 1-1/2 mm), ang. to cvl, qz, feld, gr, drk. iq.; V. poorly sorted
	55'	Dol, drab, finely xline, (1/8 - 5/16 mm), hard, cont. a few small drusy cavities; 12% caved sand; dol. slowly efferv, non-foss.
	60'	Dol, drab, fine xline (diam. 1/4 - 1/8 mm) sim. to dol. spl. 49 1/2 - 55'; 10% caved sand.
60	65'	Dol, drab, fine xline (diam. 1/4 - 1/8 mm) sim. to dol. spl. 49 1/2 - 55'; 3% caved sand.
	70'	Dol, drab, fine xline (diam. 1/4 - 1/8 mm) sim. to dol. spl. 49 1/2 - 55'; but grading to br. in small %; 3% caved sand; dol. sub transl. in part; 1% clear calcite which may be cave.
	75'	Dol, drab, fine xline (diam. 1/4 - 1/8 mm) subtransl., sim. to dol. spl. 49 1/2 - 55'; 2% caved sand gr.
	80'	Dol, lt. med gray, V. fine silty textured, hard, slow efferv., non-foss., ^{sub} subgraphitic, 60%
80	85'	Dol, drab, fine to med. xline, grading to lt. gray in 35% of spl. except for color spl. sim. to spl. 49 1/2 - 55'; 3% caved qz.
	90'	Dol, lt. gray & drab; lt. gray dol. sim. to that in spl. 75-80', 30%; sand caved 10%.
90	95'	Dol, drab, fine to med. cryst, subtransl., sim. to spl. 49 1/2 - 55'; Dol, V. lt. grayish drab, sub cryst., V. hard, dense, cherty appearing, slowly efferv., non-foss., 7%; drk. blu. green iq. mat. (Prob. cave from above). 5%
	100'	Dol, drab, med. to fine xline, sim. to spl. 49 1/2 - 55'; 1% caved sand.

Location _____ Date Drilled _____ Analyst Schuldt



100'
Dolomite, drab, fine to med. xline, sim. to dol. spl. 49 1/2 - 50'; dol. lt. gray to bluish gray, v. fine silty text, sim. in text. to gray sh. dol. spl. 10-25', 7%.

105'
Dol., drab, fine xline, sim. to dol. spl. 49 1/2 - 55', 45 %; Dol., lt. gray, v. fine silty text, sim. to gray dol. spl. 10-25', 35 %; Ls, drab, subcryst., transl., homogeneous, v. rapid efferv., 20 %

110'
Dol., wh, fine silty text, sett, 35 %; Dol., pale grn. gray, fine silty text, 35 %; Ls, drab, subcryst., transl., sim. to drab. ls in spl. 105-110'; trace of caved sand. 30 %

115'
Dol., drab, v. fine v. fine xline, fine granular appar.; dol., wh. & lt. gray, v. fine silty text, 7%; 1% caved sz gr.; <1% clear calcite.

120'
Dol., lt. gray, fine-med. xline (dom. 1/4-1/2mm), euhed. cryst., sacc. text., pyritiferous, slow to mod. efferv.; 5 % fine silty text hard gray dol.; 1 round pellet, blk, poss. phos.; <1% rounded + fractured sz; 14% ^{0.1mm} fr. fractured sz. or chalcidony (cave).

125'
Ls, drab, fine silty text, to Ls, drab, sub xline to fine xline (1/4-1/2mm), translucent, fairly strong, mod. to rapid efferv., bearing small % calcite.; 5% lt. gray dol. sim to above.

130'
Dol., rather calc., drab, fine xline sacc. text., sim. to ^{ls} spl. 125-130' in color & text.

135'
Dol., calc., drab, fine xline sacc. text., sim. to Ls spl. 125-130' in color & text.

140'
No sample

145'
Dol., drab, fine xline sacc. text., sim. to Ls. spl. 125-130' in color & text., as fragments, entirely as sand

150'
Dol., drab, fine xline sacc. text., sim. to Ls. spl. 125-130' in color & text., as frag.

155'
Dol., drab, fine xline sacc. text., sim. to Ls. spl. 125-130' in color, & text.; as frag.

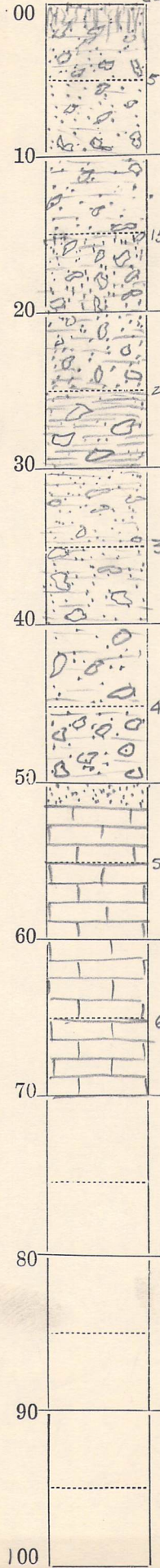
160'
Dol., drab, fine xline sacc. text., sim. to Ls. spl. 125-130' in color & text.; 5% lt. gray hard fine silty textured dol. (Prob. cave); 1% bright green sh.

165'
Dol., drab, fine xline, sacc. text., sim. to Ls spl. 125-130' in color, & text.; 5% lt. gray hard fine silty textured dol. (Prob. cave); 1% bright green sh.

170'

Location SW-SE-SW-SW, S. 2, T. 98 N. - R. 19 W., Union Twp. Date Drilled 1937 Analyst Frye

curve 1225' Alt. on Upland Plain by Thorpe Bros.



Soil; dull ochre to grey-drab, clay, silt and humus stained, and organic material. Sand, med to fine, s. ang. - s. rd. sand grains, showing a smooth possibly solutional surface texture.

Till; dominantly sand, cv. - s. ang, fine to med, and silt, crs. - med, med. buff, some clay and carbonaceous material.

Till; sand and silt; sand cv. - s. ang. med. - crs., silt, med. buff. to bluish grey drab. Some clay, Ang. fragments, pink Qtz. 1%. Non-calcareous. Large fragment of milky white cartilaginous material, probably cave.

Till; sand and silt, gray buff, with some clay, slightly calcareous. Angular fragments, 25-35%, of chert, Quartz, basic ig. rk., limestone. Much coarser than sample above.

Till; sand and silt; tan to blue-grey-buff; some clay, ang. fragments and grains to 4. mm. dia 25%, contains Qtz, chert, basic ig. types, dolomite, etc.

Till; 50% clay and fine silt, non-calcareous, dull grey-drab; Ang. fragments up to 25 mm, basic ig., Qtz., Chert, and Limestone; An absence of med. sand is conspicuous.

Till; Crs. silt and fine sand, 75%, very slightly calcareous, contains considerable ferruginous material, med. ocher-brown. Ang. - cv. fragments, up to 15 mm. dia, Qtz, chert, basic and acidic ig. rock.

Till; silt and fine sand, 75%, med. ocher-brown; Ang. - cv. fragments up to 12 mm. dia.; slightly calcareous, oxidized.

Till; silt and sand, fine; 50%; med. buff.; Ang. - cv. fragments, basic ig. rk. types, chert and Qtz., up to 4 cm. dia.

Till; sand 40%, ang. - cv., Qtz. feldspars, feldspars, silt, and 20% ang fragments ig. rk. types, Qtz., Chert, feldspar. note: Drillers log reports lms. in this interval.

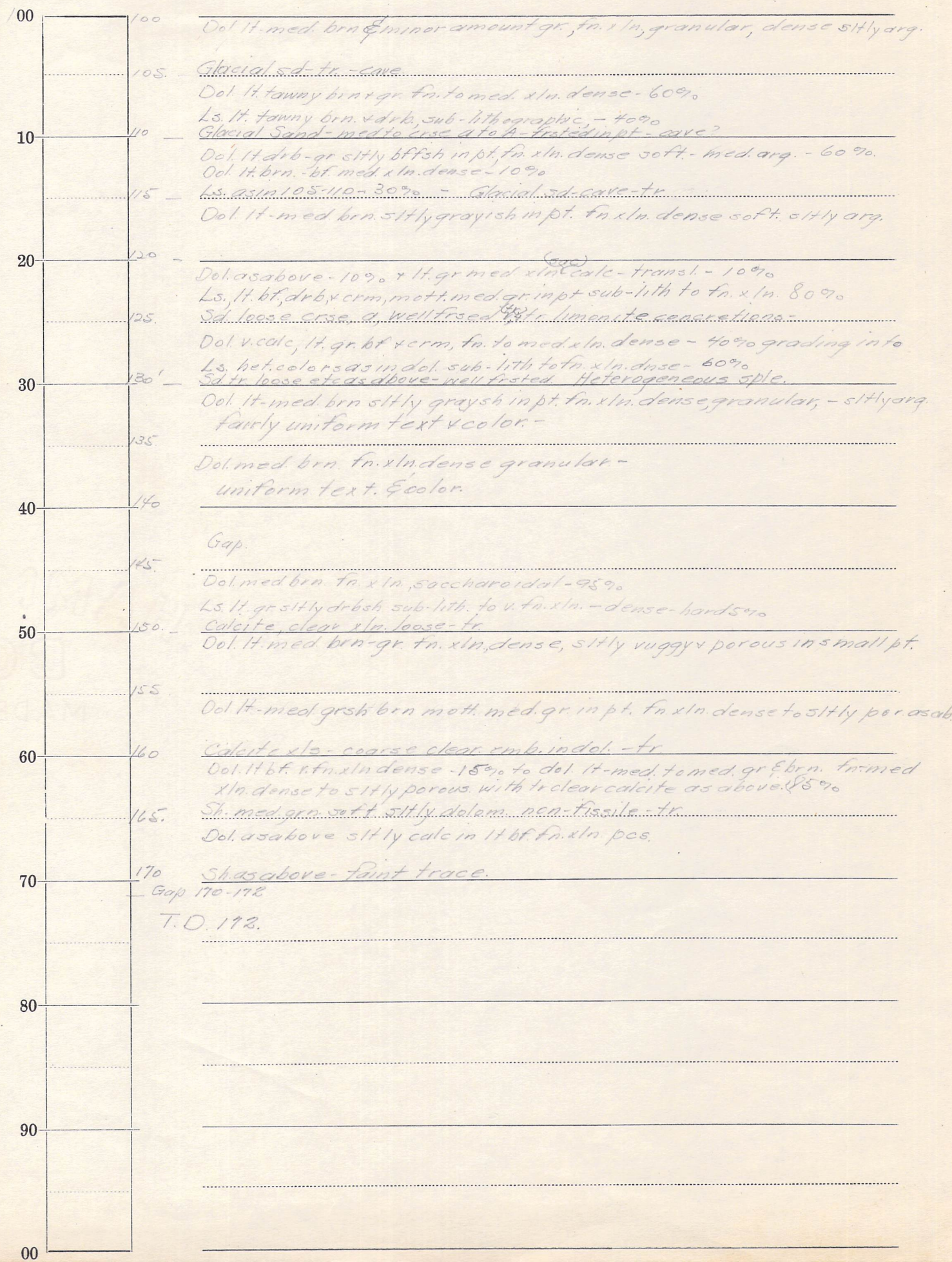
Sand; med-fine, ang. - cv., probably partly cave. Limestone; lt. grey-drab, fine grained.

Limestone; lt. grey-drab, fine grained, similar to above. Considerable sand (30-40%) probably cave.

Limestone; med. gray fine grained; sand probably cave, ferruginous nodules, fine sand loosely cemented.

Limestone; lt. grey-drab, fine grained; some sand and silt, probably cave.

Limestone;



THORPE BROTHERS WELL COMPANY

R-1-B

2340 Sixth Avenue
DES MOINES, IOWA

Drilled for Town of Grafton at Grafton, Ia

Drilling started Dec. 13th 1937 19 Completed 19

Well No. One Kind of Well Drilled Depth 172½ Size hole started 16 in.

Finish 8 G. P. M. Static head Drawdown

Water was first encountered at in Approximate Amount

Remarks

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
12"	70'	70'	Surf	St. Bk.	16"	45'
8"	92'	90	+ 2	" "		

Driller From Surface to feet

Driller From feet to feet

Driller From feet to feet

AMOUNT IN FEET	KIND OF SOIL OR FORMATION	TOTAL DEPTH FEET
2	Yellow clay	2
10	" " gravelly	12
32	" " sandy	44
25	Brown lime	69
20	Lime- bluish gray	89
10	" brown- hard	99
15	" bluish gray- shaly	114
5	" brown	119
5	" bluish gray	124
5	" hard- gray	129
43½	Dolomite	172½
	(140-145 no cuttings crevasse @ 142	

IOWA GEOLOGICAL SURVEY
Generalized Log Based on Detailed
Description of Drill Cuttings

Name of Well: Grafton Town Well Survey No. W- 0700
 Drilled by: Thorpe Well Co., Des Moines Date Dec. 13, 1937-Jan. 29, 1938
 Total Depth: 172½ ft; Curb Elevation: 1225 ft; Static Level: 41'7½" ~~xxx~~
 Casing Data: 12" casing from surface to 70'; 8" casing from 2'5" above
surface to 90'. 12" hole from 70-90' filled with concrete. Annular space
between 12" & 8" casings filled with concrete.
 Pump and Screen Data: _____

Pumping Test: 4 Hours 0 Min; Gal. Per Min. 46.2; Drawdown 5'0½" in 42 min.

<u>No.</u>	<u>Rock Unit</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u> <u>(Feet)</u>	<u>To</u>
	<u>RECENT</u>				
		Top soil--silty textured clay with granules and small pebbles of quartz, white dolomite, igneous materials, etc.	3	0	3
	<u>PLEISTOCENE SYSTEM</u>				
		Till--drab to limonite yellow, consisting of pebbly sandy clayey silt, moderately micaceous. Quartz, white dolomite, igneous rock fragments, etc. present	27	3	30
		Till--limonite yellow (clay colored), sandy clay-bound silt in upper part to sandy silt with no clay near base, non-calcareous; sand very coarse, containing igneous material	17½	8 30	47½
		Sand--buff, very coarse (major grade 2-1 mm., principal subsidiary grades 4-2 & 1-1/2 mm.), angular to curvilinear, quartz, feldspar, granite, dark igneous, etc. present	2	47½	49½
	<u>DEVONIAN SYSTEM</u>				
		<u>Shell Rock Formation</u>			
		Dolomite--drab, fine crystalline, hard, containing a few drusy cavities	27½	49½	77
		Dolomite--light to medium gray, very fine silty textured, hard	3	77	80
		Dolomite--drab to grayish drab in lower 5', fine crystalline, hard	10	80	90
		Dolomite--light drab, fine crystalline, translucent	13	90	103
		Dolomite--very light gray to light bluish gray, very fine silty texture; with a 1½' band drab, subcrystalline limestone at 109'	12	103	115
		Dolomite--drab, very fine crystalline, fine granular appearance, hard	5	115	120
		Dolomite--light gray, fine crystalline (¼-1/8 mm.) as cemented euhedral crystals, saccharoidal texture, pyritiferous	5	120	125
		<u>Cedar Valley Formation</u>			
		Dolomite--calcareous, drab, fine crystalline to saccharoidally textured, moderate effervescence; upper 5' is dolomitic limestone	45	125	170

Notes:

IOWA GEOLOGICAL SURVEY
Generalized Log Based on Detailed
Description of Drill Cuttings

Name of Well Grafton Town Well Survey No. W-0700
 Location Grafton, Worth County, SW SE SW SE 3, 98 N., 19 W.
 Drilled by Thorpe Bros. Well Co., Dec. 13, 1937 - Jan. 29, 1938
 Total Depth 172 $\frac{1}{2}$ ft. Curb Elevation 1225 ft. Static Level 41' 7 $\frac{1}{2}$ " ~~ftx~~
 Pumping Test 4 Hours 0 Min; Gal. per min. 46.2 Drawdown 5' 0 $\frac{1}{2}$ " ft. in 42 min.
 Casing Data 12" casing from surface to 70'; 8" casing from 2' 5" above surface
to 90', 12" hole from 70' to 90' filled with concrete. Annular space between 12"
and 8" casing filled with concrete.

Description of Formations

<u>No.</u>	<u>Rock Unit</u>	<u>Thick.</u>	<u>From</u> (feet)	<u>To</u>
PLEISTOCENE SYSTEM				
1.	Clay, light medium grayish brown to medium brown, light yellow in small part, semiunctuous, glistening, non-fissile, leached and oxidized till. Glacial sand trace, medium to coarse, consisting of igneous material and chert.	30	0	30
2.	Silt, orange, soft, friable, sandy and pebbly	20	30	50
DEVONIAN SYSTEM				
Shell Rock (?) formation				
3.	Dolomite, light to light medium brownish buff, fine- to medium-grained, granular, dense, slightly argillaceous, with 15% limestone, from 55 to 60 feet, light buff, fine-grained, few dolomite rhombs embedded	17	50	67
Cedar Valley (?) formation				
4.	Limestone, light tawny and buffish brown, sublithographic, dense	3	67	70
5.	Dolomite, light medium buffish brown, medium-grained, dense, with few areas coarse white calcite crystals. Limestone 20%, as in 67 to 70 feet	5	70	75

Notes:

Survey No. W-0700

<u>No.</u>	<u>Rock Unit</u>	<u>Description</u>	<u>Thick</u>	<u>From</u>	<u>To</u>
6.	Dolomite, light medium gray, sublithographic, to light medium brown and buff, fine- to medium-grained, dense, with 20% limestone, light buffish drab, medium-grained		5	75	80
7.	Limestone, light buff, buffish drab, and brown, medium-grained, with 20% dolomite, light brown, buff, and tawny, very fine-grained, dense		5	80	85
8.	Dolomite, light brownish buff, fine- to medium-grained, dense, with 20% limestone, light tawny buff, fine-grained, dense		5	85	90
9.	Dolomite, light medium brownish buff, medium-grained, slightly porous, with 15% limestone, light medium brownish buff, sublithographic to fine-grained		5	90	95
10.	Dolomite, medium brown to grayish brown, fine-grained, slightly argillaceous in part with 40% limestone from 105 to 110 feet, light tawny brown, and drab, sublithographic		15	95	110
11.	Dolomite, light drabish gray to light medium brown, fine-grained, dense, soft, slightly argillaceous, with 30% limestone, light brown and drab, sublithographic, as in 105 to 110 foot interval		10	110	120
12.	Limestone, light buff, drab, and cream, mottled medium gray in part, sublithographic to fine-grained, with 20% to 40% dolomite, light gray, buff, and cream, fine- to medium-grained, dense, very calcareous in part		10	120	130
13.	Dolomite, light medium brown, fine-grained, dense, granular, slightly argillaceous, with trace free calcite, clear, coarse crystalline		20	130	150
14.	Dolomite, light medium grayish brown with minor amount light buff at base, fine-grained, dense to slightly porous, trace embedded calcite, clear, coarsely crystalline. Shale trace from 160 to 170 feet, medium green, soft, non-fissile, slightly dolomitic		20	150	170
15.	No sample		2 $\frac{1}{2}$	170	172 $\frac{1}{2}$
Total depth					172 $\frac{1}{2}$

Notes on Grafton City Well No. 1
Worth County
Survey No. W-0700

Samples are taken at 5 foot intervals and are complete except in interval 140 feet to 145 feet and 170 feet to 172½ feet, and are in good condition.

The bed rock is Devonian, mapped as Shell Rock. It resembles the Shell Rock of Cerro Gordo fairly closely but shows variation in lithology that seems typical of all Shell Rock of the general area. The Shell Rock formation in most wells appears to be chiefly dolomite with partings of light gray and drab fine-grained to sublithographic limestone. The dolomite is usually light to light medium drab and brown fine-medium to coarse-grained subsaccharoidal to granular dense.

The line between Shell Rock and Cedar Valley cannot be drawn with certainty. There was, in this well, no embedded sand which might be taken as a possible break in deposition. The samples in the upper 40 or 50 feet of bed rock contain loose sand in large amounts, all of which is believed to be glacial cave.

It is possible that my Shell Rock - Cedar Valley line is much too high. It was placed there on the evidence of the highest occurring limestone which was light tawny brown and buff, sublithographic, dense, appearing in general to be Cedar Valley lithology.

Definite correlation of this well, as in most other wells of this area cannot be definitely made without studying many more sets of samples.

TOWN OF GRAFTON, IOWA---OWNER----- THORPE WELL COMPANY-CONTRACTOR

GEOLOGICAL FORMATION ENCOUNTERED ON DRILLED WELL
8 INCH WELL---APPROXIMATELY 172 FEET 6 INCHES DEEP.

FROM	0 FEET	TO	5 FEET	
	0		5	TOP SOIL-YELLOWISH BROWN
	5		10	YELLOW CLAY
	10		15	YELLOW CLAY
	15		20	YELLOW CLAY
	20		25	SANDY CLAY
	25		30	BROWN CLAY
	30		35	YELLOW CLAY SANDY
	35		40	YELLOW CLAY SANDY
	40		45	YELLOW CLAY
	45		50	LIMESTONE
	50		55	LIMESTONE-BROWN
	55		60	LIMESTONE-BROWN
	60		65	LIMESTONE-BROWN <i>Some water</i>
	65		70	LIMESTONE-BROWN
	70		75	LIMESTONE-BROWN
	75		80	LIMESTONE-BLUIISH GREY
	80		85	LIMESTONE-BLUIISH GREY
	85		90	LIMESTONE-BLUIISH GREY
	90		95	LIMESTONE-BROWN-HARD
	95		100	LIMESTONE-BROWN-HARD
	100		105	LIMESTONE-BLUIISH GREY-SHALY
	105		110	LIMESTONE-BLUIISH GREY
	110		115	LIMESTONE-BLUIISH GREY-SHALY
	115		120	LIMESTONE-BLUIISH GREY <i>brown</i>
	120		125	LIMESTONE-BLUIISH GREY <i>shaly</i>
	125		130	LIMESTONE-GREY-HARD <i>ax</i>
	130		135	DOLOMITE
	135		140	DOLOMITE
	140		145	NO SAMPLE (CREVICE AT 142 FEET)
	145		150	DOLOMITE <i>More water</i>
	150		155	LIMESTONE-BROWNISH GREY
	155		160	LIMESTONE-GREY-SHALY
	160		165	LIMESTONE-BROWN-HARD
	165		170	LIMESTONE-BROWNISH GREY
	170		172' 6"	NO SAMPLE (SAMPLE WASHED AWAY) <i>crevasse</i>

*Data received from Mr. L.J. Klise
 W.P.A Engineer, Box 143, Forest City*

Corrected from Drillers Log.

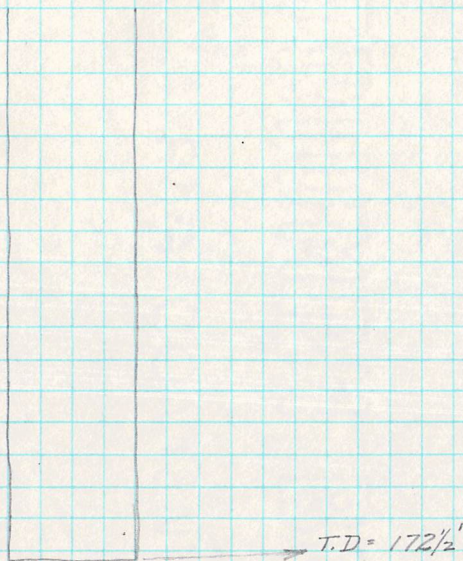
Driller: Wyman Ellis.



Grafton, Worth Co.

Pumping Test of Jan. 29, 1938

Wyman Ellis, driller in charge



18 sacks half & half sand except at top

16" hole surface

12" hole to 90' b.c.

8" casing 2'6" above curb to 90'

12" casing to 70'

concrete in 12" hole from 90' to surface

start Dec. 13, 1937

Main supply 150-172'lv

Minor supply 65'

Little water at base of drift