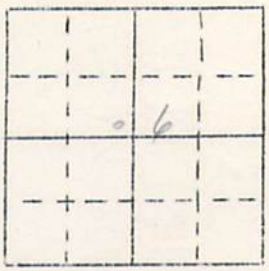
IOWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey

W-0814

RECORD OF WELL



Location:

Town: Charles City (N E / S W); County Floyd

SE-SE-NW sec. 6 T. 95 N., R. 15 W. St. Charles Twp.

Well name and number City Well #4

Owner _____ Address _____

Tenant _____ Address _____

Contractor Layne Western Address Omaha.

Drillers Clarence O. Holland, in charge

Drilling dates June 21, 1938 — February 14, 1939

Well data:

Elevations: Drilling curb 1024' feet; Land surface 1018.5 feet

Determined by _____

Topographic position Upland.

Total depth: Reported 1305 feet, Measured _____ feet

Drilling method cable

Hole and casing data 70' of 30" pipe, 127' of 26" p.p. — 295' of 16" C.I. CASING from curb to 295; 118'2" of 12" liner from 661'10" to 780' shoe top; bottom; 290' of 10" from 721 to 1011

(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.)

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

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

Sources of water: Principal Shakopee-Oneota; Others _____

Production data: Date _____

Static depth to water 63'1" Measuring point _____

Pumping level 72'11 at 625 g.p.m.

Specific capacity 6.9 g.p.m. per ft. drawdown; Temperature 50½ °F.

Pump data; Type pump Turbine Column Dia. _____ Length 109

Cylinder or bowls: Dia. 15" Length _____ Suction pipe 12 (3 stages)

Power _____ 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	Feb 14, 1939			
Sampled by	H.G.H.			
Total solids	310			
Insoluble matter	22.8			
Alkalinity (Meo)	230.0			
Alkalinity (Phn)	0.0			
pH	7.0			
$Fe_2O_3 + Mn_2O_3 + Al_2O_3$	12.4			
Alkali as sodium	11.5			
Calcium	56.9			
Magnesium	25.2			
Iron (unfiltered)	0.6			
Manganese	0.08			
Nitrate	~~1.00~~ 4.4			
Fluoride	1.0			
Chloride	4.0			
Sulfate	13.6			
Bicarbonate	200.6			
Hardness (ppm)	247.			
Hardness (gpg)	14.4			

Remarks _____

Laboratory data: Sample storage location _____

Sample range 0-1300 No. spls. 259 No. dupls. & cond. 255 & cond

Spls. prepared by _____ Washed range _____ by _____

Driller's log and cond. _____

Insoluble residues: Prepared by 100-1300 Studied by _____ Strip log _____

Microscopic study Schuldt, Chas, Carmody strip log ✓

Gen. log ✓ Correl. by —

John C. Moore Corporation, Rochester, N. Y. Binder and holes in leaves, each Patented 1906. 390345

Charles City, Floyd Co.
Well No 4.

Drillers Log - From

	Thick.	From	To	
Black loam & sandy clay	5	0	5	
Sand	50	5	55	
Sand, coarse	10	55	65	
Gravel	13	65	78	50 gpm flow
Clay gray	19	78	97	
Gravel	13	97	110	Flows 3' above grou 200 gpm q'dd
Coarse sand & little clay	16	110	126	
Broken lime	4	126	130	
" " & shale streaks	25	130	155	
Brown Lime	25	155	180	
Lime grayish brown	5	180	185	
" " " little harder	5	185	190	
Lime, hard gray	5	190	195	
Lime - hard, gray	10	195	205	
" " " with brown streak	10	205	215	
" " "	20	215	235	
" " " with brown streaks	5	235	240	
Gray shale	5	240	245	
" " lime	25	245	270	
Gray lime, shale streaks	15	270	285	
Dark gray lime	45	285	330	
Gray lime with shale streaks	5	330	335	
Gray shale	25	335	360	
" " & lime rock	5	360	365	
Gray lime & shale	40	365	405	
Hard gray lime	58	405	463	
Lime with shale streaks	27	463	490	
Gray lime (Water)	10	490	500	
Brown lime	5	500	505	
Gray lime	10	505	615	
Hard gray	35	615	650	
Brown lime	34	650	684	
Shale green	2	684	686	
Hard brown & gray lime	4	686	690	

Continued

John C. Moore Corporation, Rochester, N. Y. Binder and holes in leaves, each Patented 1906. 390345

Charles City, Floyd.
City Well No. 4.

Oct. 22, 1938

Green shale	1	690	691	
Hard dark gray lime	9	691	700	Water
Green & brown shale	10	700	710	
Green shale sticky	20	710	730	
Hard brown lime	18	730	748	
Green shale	2	748	750	
Brown lime shale	15	750	765	
Sandy shale lime	10	765	775	
Sand (Verbal "Dirty")	65	775	840	
Samples to here White gray lime, hard		840	892	855 0:1.22

Generalized Log

Charles City Well # 4. W-0814

Drilled by Layne Western Co. Date: 6/21/38 -
Curb ~~sea~~ elevation 1024'

Description of formation

No.	Rock Unit	Thick	From	To
	Recent and Pleistocene Alluvium			
1.	Sand, coarse to very coarse to granules with occasional small pebbles, light brown, (Major Grade 1-½ mm, Principal subsidiary Grade 2-1 mm.). Quartz 80%, Limestone and other igneous materials 20%.	40'	0'	40'
2.	Clay, smoke gray, actually very fine sand to silt, momentarily effervescent.	10'	40'	50'
3.	Sand, light gray buff, medium grained (Major Grade 1/2 - 1/4 mm. Principal Subsidiary Grade ¼-1/8 mm). Coarse sand common	5'	50'	55'
4.	Gravel, light buff, 60% granules and small pebbles, 40% sand, very coarse (Major Grade 2-1 mm., Principal Subsidiary 1-½ mm.), Sample averages 45% light buff limestone, 40% quartz, and 15% miscellaneous igneous material. Sand very dominantly quartz.	25'	55'	80'
5.	Clay, glacial, medium to dark gray, sandy, pebbly, silty textured, momentarily effervescant, slightly micaceous.	15'	80'	95'
6.	Gravel, (coarse to very coarse sand 35%, granules 30%, small pebbles 35%. Sand dominantly quartz; granules and pebbles dominantly limestone and igneous material.	35'	95'	130'
7.	No sample well flowing Possible base of drift.	5'	130'	135'
	Dex-Sil System			
8.	No sample "shale and lime shell".	5'	135'	140'
9.	Shale, light gray, homogeneous, slightly calcareous, entirely as well mud.	5'	140'	145'
10.	Limestone, light drab to light buff grading from ~~lime~~ dolomite in the upper 5' to only slightly dolomitic in lower 15'.	25'	145'	170'
11.	Limestone, light gray, very fine crystalline, hard, highly fossiliferous in upper 10'. Slightly dark speckled between 175' and 180', and with bands of light buff limestone between 185' and 190'.	25'	170'	195'
12.	Limestone, light gray to light buff, fine to coarse crystalline, with numerous small drusy cavities lined with calcite crystals, highly fossiliferous (bryozoans and brachiopod(?) shells)	5'	195'	200'
13.	Limestone, light gray, fine textured, firm, fossiliferous, for the most part dark speckled; 1-3% ~~ore~~ coarse clear quartz sand grains; trace of pyrite.	20'	200'	220'

		Thick	From	To
14.	Limestone, drab to brownish, transluscent, very fine crystalline, much clear calcite, trace of pyrite.	8'	220'	228'
15.	Limestone, blue gray, subtranslucent, with much clear calcite. Medium crystalline,	4'	228'	232'
16.	Dolomite, calcareous ~~Limestone, dolomitic, to dolomite, calcareous~~, light buff; chert and chalcedony ?, buff to drab and brown banded, 20-50%. Limestone is medium crystalline, very numerous small cavities. Much flour from drilling.	13'	232'	245'
	Maquoketa sh or limestone			
17.	Shale, very pale gray, calcareous, ~~wholly as well mud~~, probably interbanded soft dolomitic limes and limy shales.	~~5'~~ 15'	~~245'~~	~~250'~~ 260'
~~18.~~	Almost entirely as well mud.	~~25'~~	245'	~~270'~~
18.	Dolomite, light drab, calcareous, fine crystalline, some free calcite, trace pyrite. Much well flour in upper ½, and at the base.	~~50'~~ 50'	260	315 ~~320'~~
19.	Dol, lt. buff, fine xline, hrd, with occasional small cavities. No well mud.	7'	315	322
20.	Dolomite			
19.	Limestone, or shale (?), very light gray, slow effervescence, in parts almost wholly well mud. Possibly similar to unit ~~18~~ 19 above. 20% med. gr. qz sd. fragments in lower 5'	~~15'~~ 13'	~~320'~~ 322	325'
20.	Dolomitic Shale, medium gray, limy, entirely as well mud.	~~20'~~ 30'	335'	~~355'~~ 365
21.	Shale, medium to light gray, and dolomite, light brown interbanded. Dolomite medium crystalline, moderately hard.	~~20'~~ 10'	~~355'~~ 365	375'
	Galena Platteville			
22.	Dolomite, light gray, calcareous, medium crystalline, moderately hard. Considerable well mud. 0-5% chert.	~~65'~~ 65'	375'	~~440'~~
23.	Limestone, very light drab gray, very fine textured, rather soft, much well mud. 2-10% white, porcelain textured, fresh to weathered chert.	20'	440'	460'
24.	Dolomite, drab to buff, fine crystalline, weak, drills down to flour and fine crystalline sand (70-90%)	30'	460'	490'
25.	Dolomite, light drab, medium crystalline, hard, compact, no ~~well mu~~ well mud. Less than 2% pyrite. Less than 1% calcite.	40'	490'	530'
26.	Dolomite, light drab, medium crystalline, weak - drills to well mud and crystalline sand. Rare medium sized quartz sand grains. 50-85% well mud.	60'	530'	590'
27.	Dolomite, light drab, fine crystalline, weak - drills to well mud and fine crystalline sand. Traces of chert and pyrite throughout.	29'	590'	619'
28.	Limestone, very light buff, fine textured, fossiliferous, thin slabby appearance and with trace of pyrite.	6'	619'	625'
29.	Dolomite, calcareous, very light brown to drab, fine to medium crystalline. Drills to flour and fine crystalline sand.	25'	625'	650'
30.	Limestone, light brown to light gray, slightly dolomitic, fine to medium crystalline, transluscent. slightly slabby appearance.	5'	650'	655'

		Thick	From	To
31.	Dolomite, light brown, medium crystalline, rather ~~porous,~~ hard, porous, hard, transluscent. 1-2% light brown chert. ~~1%~~ 1% pyrite.	20'	655'	675'
32.	Limestone, light brown, fine to medium crystalline, sub-transluscent, hard, fossiliferous. 1% pyrite.	6'	675'	681'
33.	Dolomite, drab to light brown, medium to fine crystalline, hard, transluscent.	4'	681'	685'
34.	Shale, very pale green gray, silty textured, very calcareous.	15'	685'	700'
35.	Shale, dark green ~~gray~~, with occasional bands of dark brown, non-calcareous, waxy feel. Brown bands contain many small flattened, highly polished discs - possibly contretianary.	30'	700'	730'
36.	Limestone, very dolomitic, light drab, fine textured, sub-transluscent.	5'	730'	735'
37.	Shale, light gray, very calcareous, as silty textured well mud.	5'	735'	740'
38.	Limestone, light brown, fine textured, transluscent, hard.	8'	740'	748'
39.	Shale, green, dense, as chips and splinters - non-calcareous (Glenwood type)	9'	748'	757'
40.	Limestone, light drab, fine to medium crystalline, flaky texture, fossiliferous	3'	757'	760'
St. Peter SS				
41.	Sandstone, pale green, coarse (Major Grade 1-$\frac{1}{2}$ mm, Principal Subsidiary Grade 1/2-1/4 mm), with much powdered lime or calcareous shale in interstices. ~~fine-to-medium-grained~~	10'	760'	770'
42.	Sandstone, pale green, medium grained (major grade 1/2-1/4 mm, principal subsidiary grade 1/4-1/8 mm). With much powdered lime or calcareous shale in the interstices	5'	770'	775'
43.	Sandstone, white, medium grained (major grade $\frac{1}{2}$-$\frac{1}{4}$ mm, principal subsidiary grade $\frac{1}{4}$-1/8 mm), no well mud.	50'	775'	825'
44.	Sandstone, very light gray, medium grained (major grade $\frac{1}{2}$-$\frac{1}{4}$ mm, Principal Subsidiary grade $\frac{1}{4}$-1/8 mm), with much moderately effervescing well flour	15'	825'	840'
Prairie Du Chien				
45.	Dolomite, drab, very fine crystalline, hard, porous, with much well flour.	5'	840'	845'
46.	Shale or dolomite flour, white, moderately effervescant; 90% as well mud. Washed sample shows dolomite similar to that of unit 45	5'	845'	850'

C. Moore Corporation, Rochester, N. Y. Binder and holes in leaves, each Patented 1906. 390345

MOORE'S MODERN METHODS

Dec 21, 1939

H.J.R.

Charles City City Well No. 4
Present depth 858

Casing: (In addition to that in H.G.H.'s notes)
296' of 16" cast iron casing from curb to 295'
Cemented between 16" casing & hole.
118½' of 12" liner from 661'10" to 780' shoe top & bottom.
Information from driller.

Pumping equipment.
Layne Turbine Pump
15" bowls
12' of 8" suction with bottom at 101'10"
Powered by belt from Auburn-Taylor tractor

Pumping test started with 5" orfice on 6" pipe 15' long.
Later changed to 4" orfice.
Orfices calibrated at Perdue University
Information from J.S. Dawson

Before cementing casing the well was pumped 1600 gpm with a drawdown of 17" (inches). At 2400 gpm the draw down was 53" (inches) Information from driller

Well treated with 5# chlorinated lime (24% available chlorine) on Dec. 20. Chlorinated lime was put in in small amounts. Information from J.S. Dawson