WRD Exp. (GW)
Aug. 1964

U. S. DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

Water Resources Division Well Schedule Form

MASTER CARD

Record by D. AARONSON Source of data FILE Date 6/23/65 Map 1:63,360 COUNTY HWY.

State IOWA [16] County (or town) CHEROKEE [18]

Latitude: 42 49 34 N Longitude: 095 47 47 Sequential number: 1

Lat-long accuracy: 2 T 93 N S, R 42 E W Sec 34, NE ¼, SW ¼, SW ¼ 5

Local well number: 093N42W34CCAA Other number: W-3152 BCM

Local use: 0315248CITY Owner or name: TOWN OF MARCUS

Owner or name: MARCUS IOWA Address: MARCUS IOWA

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, (C) Comm, (D) Dewatering, (F) Fire, (H) Dom, (I) Irr, (N) Ind, (P) P-S, (S) Stock, (T) Instit, (U) Unused [P]

Use of well: (A) Anode, (D) Drain, (G) Seismic, (O) Obs, (P) Oil-gas, (R) Recharge, (S) Spring, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed [W]

DATA AVAILABLE: Well data [1] Freq. W/L meas.: INVENTORY [Ø] Field aquifer char.

Hyd. lab. data:

Qual. water data: type: COMPLETE [C]

Freq. sampling: INTERMITTENT [I] Pumpage inventory: yes / no, period:

Aperture cards: yes

Log data: GEOLOGIST LOG [G]

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 880 ft [880] Meas. (rept) [6]

Depth cased: (first perf.) 745 ft [745] Casing type: WROUGHT IRON Diam. 12 in accuracy [12]

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (O) open end, (P) perf., screen, sd. pt., (S) shored, (T) open hole, (W) other, (Z) [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 & CABLE [H]

Date Drilled: 1948 [9 48] Pump intake setting: ft

Driller: LAYNE WESTERN CO. (A.L. HARRIS) OMAHA, NEBRASKA (name, 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 [ ] Deep / Shallow [D]

Power (type): diesel, elec, gas, gasoline, hand, nat gas, LPG, wind; H.P. [ ] Trans. or meter no.

Descrip. MP LSD 0 ft above/below lsd, Alt. MP 1459

Alt. LSD: 1459 [1459] Accuracy: (source) HAND LEVEL [1]

Water Level 290 ft above/below MP; Ft above/below lsd [250] Accuracy: REPORTED [6]

Date meas: JAN 1948 [1 48] Yield: 233 gpm [233] Method determined

Drawdown: 8 ft [8] Accuracy: REPT [6] Pumping period hrs

QUALITY OF WATER DATA: Iron 1.7 ppm [5] Sulfate 820 ppm [8] Chloride 8.5 ppm [0] Hard. 970 ppm

Sp. Conduct 1920 K x 10^6 [5] Temp. °F Date sampled 12/27/61 [D 6]

Taste, color, etc.

42W.34 ccaa

Well Number 42 49 34 (S) 005 47 47
d m s d m s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD | Physiographic Province: CENTRAL LOWLAND [12] | Section: DISSECTED TILL PLAIN [E] | Drainage Basin: LITTLE SIOUX [36C] | Subbasin: [ ]

Topo of well site: local depression, flat surface, (H)illtop, hillside, terrace, valley flat, UPLAND [H]

MAJOR AQUIFER: ORDOVICIAN system, UPPER series [03] MAQUOKETA FM. aquifer, formation, group [UM]

Lithology: DOLOMITE [D] | Origin: MARINE [6] | Aquifer Thickness: 30 ft

[30] Length of well open to: 30 ft | [30] Depth to top of: 785 ft [78]

MINOR AQUIFER: ORDOVICIAN system, MIDDLE series [02] GALENA aquifer, formation, group [MG]

Lithology: CHERTY DOL [QD] | Origin: [6] | Aquifer Thickness: ft

[ ] Length of well open to: 60 ft | [60] Depth to top of: 820 ft [820]

Intervals Screened:

Depth to consolidated rock: 600 ft [600] | Source of data: WELL CUTTINGS [C]

Depth to basement: ft [ ] | Source of data: [ ]

Surficial material: [ ] | Infiltration characteristics: POOR [4]

Coefficient Trans: gpd/ft [ ] | Coefficient Storage: [ ]

Coefficient Perm: gpd/ft^2; Spec cap: 29.1 gpm/ft; Number of geologic cards: [ ]

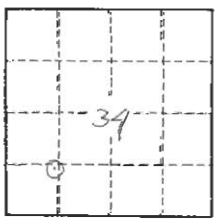
CASING:

12" PIPE 0-616'

10" LINER 598'9"-657'

8" LINER 643'1"-745'

OPEN HOLE 745'-880'



GPO 844-225

7½' MARCUS Quad
4249340954756 01
93-42-34 CCBB
1980 field located by D. Karsten

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

3152

RECORD OF WELL

Location:

Town: MARCUS (N E / S W): County Cherokee

NE/c SW¼ SW¼ sec. 34 T. 93 N., R. 42 W. Twp.

Well name and number Marcus Town Well (1948)

Owner Town of Marcus Address

Tenant Address

Contractor Layne-Western Company Address Omaha & Ames

Drillers Rotary hole - A.L. Harris

Drilling dates Started Nov. 1947

Well data:—

Elevations: Drilling curb 1461 feet; Land surface 1459.5 feet

Hand level from R.R sta. at Marcus using Elev. of 1455'

Determined by W.E. Hale

Topographic position Upland

Total depth: Reported feet, Measured feet

Drilling method Rotary to depth of ; Cable tool

Hole and casing date (6') of 12" pipe set in 15-inch hole at depth of

Original depth to water ft. above / below Date

Original elevation of water level ft.; Source of data

Sources of water: Principal ; Others

Production data: Date _____

Static depth to water _____ Measuring point _____
Pumping level _____ at _____ g.p.m.

_____ _____
_____ _____
_____ _____

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

Pump data; Type pump _____ Column Dia. _____ Length _____
Cylinder or bowls: Dia. _____ Length _____ Suction pipe _____
Power _____ Airline _____
Estimated rate of production: _____ g.p.m. for _____ hrs. a day
Use of water _____

WATER ALALYSES (in parts per million)

Date samples				
Sampled by				
Total solids				
Insoluble matter				
Alkalinity (Meo)				
Alkalinity (Phn)				
pH				
Fe_2O_3- Mn_2O_3-Al_2O_3				
Alkali as sodium				
Calcium				
Magnesium				
Iron (unfiltered)				
Manganese				
Nitrate				
Fluoride				
Chlordie				
Sulfate				
Bicarbonate				
Hardness (ppm)				
Hardness (gpg)				

Remarks _____

Laboratory data: Sample storage location _____

Sample range _____ No. spls. _____ No. dupls. & cond. _____
Spls. prepared by _____ Washed range _____ by _____
Driller's log and cond. _____
Insoluble residues: Prepared by _____ Studied by _____ Strip log _____
Microscopic study O-880 strip log 6-9-48
Gen. log _____ Correl. by R. Wehner

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TEST WELL REPORT

City Marcus State Iowa Date Jan. 23, 1948

Contract Marcus, Iowa Driller A. L. Harris

Test No. 1 Helpers Clarence Frederick

Static Water Level

Test Log

0 - 5'	Top soil
5 - 10'	Yellow clay
10 - 15'	Sand
15 - 30'	Sandy clay
30 - 40'	Blue clay
40 - 90'	Yellow clay
90 - 95'	Sandy, soft clay
95 - 110'	Blue clay
110 - 224'	Blue clay with streaks of yellow clay
224 - 237'	Boulders & blue clay
237 - 265'	Cemented sand & gravel, with clay mixture-Hard drilling
265 - 589'	Blue shale with hard streaks & a few small boulders
589 - 595'	Soft lime rock
595 - 602'	Red shale
602 - 612'	Blue shale
612 - 618'	Medium soft limerock

Size Mud Pit—Length _____, Width _____, Depth _____

WATER BEARING FORMATION DATA

Depth	Wt. Mud Lbs. per Gal.	Inches Mud Taken from Pit	Other Data
_____ to _____			
_____ to _____			
_____ to _____			
_____ to _____			
_____ to _____			
_____ to _____			
_____ to _____			

REMARKS:

F-4 3M 7-46-P

(See Other Side)

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 093-42W-34CCAA
Aquifer Code(s) Ø3UM Ø2MG
Owner's Name MARCUS CITY (1948)
W Number 03152

Card Q

State: IOWA (19) County: CHEROKEE (18) Town: MARCUS, IOWA

	Latitude	Longitude	Seq. No.	Date (M D Y)
Well No.	42493 4N (5–11)	095 47 47 (12–18)	1 (19)	03 29 51 (20–25)

Sampling Depth	880 (26–29)	Type	1 (30)	Kx10⁶	1750 (31–35)	pH	7.5 (36–38)	Temp. °F		(39–41)
SiO_2	(42–44)	Ca	257. (45–49)	Mg	74. (50–53)	Na +K	113. (54–58)	K	C (59–61)	
HCO_3	373 (62–65)	CO_3	0 (66–67)	SO_4	821. (68–72)	Cl	11. (73–78)	Source No.	3 (79)	Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F	1.4 (26–28)	NO_3	13. (29–32)	PO_4	(33–35)	B	(36–38)	Al	(39–41)	Fe	30. (42–45)
Mn	0. (46–49)	Cu	(50–52)	Pb	(53–54)	Zn	(55–57)				

Determined (Solids)	1030 (58–63)	Calc.	(64–69)	Ca,Mg	946 (70–73)
Hardness Non-Carb.	640 (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 $CaCO_3$	306 (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: 1W

Published:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 093-42W-34 CCAA
Aquifer Code(s) Ø3UM Ø2MG
Owner's Name MARCUS CITY (1948)
W Number 03152

Card Q

State: IOWA [19] (1 2) County: CHEROKEE [18] (3 4) Town: MARCUS, IOWA

Well No. Latitude [42 49 34 N] (5–11) Longitude [095 47 47] (12–18) Seq. No. [1] (19) Date M D Y [08 17 49] (20–25)

Sampling Depth [880] (26–29) Type [1] (30) Kx10^6 (31–35) pH [7.4] (36–38) Temp. °F (39–41)

SiO_2 (42–44) Ca [254.] (45–49) Mg [78.] (50–53) Na ↑K [108.] (54–58) K [.C] (59–61)

HCO_3 [383] (62–65) CO_3 [0] (66 67) SO_4 [824.] (68–72) Cl [11.] (73–78) Source No. [3] (79) [Q] (80)

Card R

Duplicate Columns 1-25 from Card Q

F [1.4] (26–28) NO_3 [53] (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe [1.] (42–45)

Mn [.03] (46–49) Cu (50–52) Pb (53 54) Zn (55–57)

Solids Determined [1600] (58–63) Calc. (64–69) Hardness Ca,Mg [957] (70–73) Non-Carb. [643] (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 $CaCO_3$ [314] (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: 1/11

Published:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 093-42W-34CCAA
Aquifer Code(s) Ø3UM Ø2MG
Owner's Name MARCUS CITY (1940)
W Number 03152

Card Q

State: IOWA (19) County: CHEROKEE (18) Town: MARCUS, IOWA

	Latitude	Longitude	Seq. No.	Date (M D Y)
Well No.	42934N (5–11)	095474 7 (12–18)	1 (19)	09 23 68 (20–25)

Sampling Depth	880 (26–29)	Type	1 (30)	Kx10⁶	1900 (31–35)	pH	6.9 (36–38)	Temp. °F	57 (39–41)	
SiO_2	13. (42–44)	Ca	272. (45–49)	Mg	70. (50–53)	Na	110. (54–58)	K	1 4. (59–61)	
HCO_3	401 (62–65)	CO_3	0 (66 67)	SO_4	830. (68–72)	Cl	7. (73–78)	Source	3 (79)	No. Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F	1.2 (26–28)	NO_3	.1 (29–32)	PO_4	(33–35)	B	(36–38)	Al	(39–41)	Fe	1.5 (42–45)									
Mn	.11 (46–49)	Cu	(50–52)	Pb	(53 54)	Zn	(55–57)													
Determined Solids	1610 (58–63)	Calc.	(64–69)	Ca,Mg	970 (70–73)	Hardness Non-Carb.	641 (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 $CaCO_3$	329 (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: 1/W

Published:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 093-42W-34CCAA
Aquifer Code(s) Ø3UM ØZMG
Owner's Name MARCUS CITY (1948)
W Number 03152

Card Q

State: IOWA (1 9) (1 2) County: CHEROKEE (1 8) (3 4) Town: MARCUS, IOWA

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

Sampling Depth 8 8 0 (26–29) Type 1 (30) Kx10^6 1 7 7 0 (31–35) pH 7.4 (36–38) Temp. °F (39–41)

SiO_2 1 3. (42–44) Ca 2 5 5. (45–49) Mg 7 7. (50–53) Na 9 6. (54–58) K 1 4. (59–61)

HCO_3 3 7 8 (62–65) CO_3 0 (66 67) SO_4 8 3 5. (68–72) Cl 1 0. (73–78) Source No. 3 (79) Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F 1.6 (26–28) NO_3 .4 (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe 4.0 (42–45)

Mn .0 5 (46–49) Cu (50–52) Pb (53 54) Zn (55–57)

Determined Solids 1 6 1 0 (58–63) Calc. (64–69) Ca,Mg 9 5 3 (70–73) Hardness Non-Carb. 6 4 3 (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 $CaCO_3$ 3 1 0 (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: _____ Date: 1W

Published: _____

093-42W-34 CCAA

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

ØUM

W-3152

Water Quality
(ppm)

Card Q

State: IOWA (16) County: CHEROKEE (18) Town: MARCUS

Well No. Latitude 42 49 34 N (5–11) Longitude 095 47 47 (12–18) Seq. No. 1 (19) Date M D Y 12 27 61 (20–25)

Sampling Depth 880 (26–29) Type 1 (30) Kx10⁶ 1920 (31–35) pH 7.5 (36–38) Temp. °F (39–41)

SiO_2 15. (42–44) Ca 260. (45–49) Mg 78. (50–53) Na 91. (54–58) K 13. (59–61)

HCO_3 388 (62–65) CO_3 0 (66–67) SO_4 820. (68–72) Cl 85. (73–78) Source No. 3 (79) Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F 1.2 (26–28) NO_3 LESS THAN .4 (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe 1.7 (42–45)

Mn .08 (46–49) Cu (50–52) Pb (53–54) Zn (55–57)

Solids Determined 1580 (58–63) Calc. (64–69) Ca,Mg 970 (70–73) Hardness Non-Carb. 652 (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 $CaCO_3$ 318 (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

Verified PMJ
Punched FCH
Punched by: _____ Date: _____

Published: _____

Log of Test Well for City of Marcus, Iowa
Gus Pech Foundry & Mfg. Co., LeMars, Iowa
12-4-46

0 -	5'	Black top soil
5 -	10'	Yellow clay
10 -	25'	Clay with water
25 -	36'	Sandy clay with water
36 -	90'	Brittle blue & yellow clay
90 -	95'	Water bearing sand
95 -	227'	Blue clay
227 -	229'	Sand & stone with water
229 -	258'	Blue clay
258 -	261'	Boulders and rock
261 -	596'	Dry blue clay
596 -	634'	Soft lime stone
634 -	645'	Soft red shale with water
645 -	650'	Hard clay
650 -	655'	Water bearing limestone

Well has a 317 ft. raise of water

IOWA GEOLOGICAL SURVEY

TABULATION OF WATER ANALYSES

(parts per million)

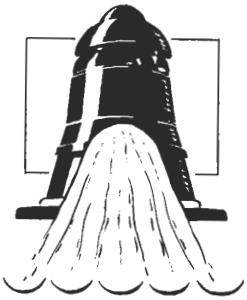
COUNTY Cherokee

TOWN Well No. Depth Use & location Ft.	Geol. form.	Diss. Solids	Ins. Mat.	NO_3	Na	Ca	Mg	Fe	Mn	Al	F	Cl	SO_4	HCO_3	PO_4	BO_3	Calc. Hard.
Marcus Town Well	St.P. Sands	1650	16.8	.60	117.3	194.3	103.7	0.7	0.1		1.0	11.0	816.5	392.8			913
Cherokee - St. Hospital	St.P.	1378			258	220	53	8.0				20	651	306			770

NOTES:

LAYNE WELLS
AND
LAYNE PUMPS

FACTORIES:
MEMPHIS, TENN.
HOUSTON, TEXAS
LOS ANGELES, CALIF.



LAYNE-WESTERN COMPANY

AFFILIATED WITH LAYNE & BOWLER, INC.

TELEPHONE KEnwood 5888

3

FEB 26 1947

4430 COMMERCIAL AVENUE
OMAHA 11, NEBRASKA

Febr. 25, 1947

Dr. H. G. Hershey
Iowa Geological Survey
Iowa City, Iowa

Dear Dr. Hershey:

We are attaching copy of log recently drilled by Gus Pech Foundry & Mfg. Co., LeMars, Iowa for the town of Marcus, Iowa.

It is our understanding that they recommend that the well be finished at a depth of 660' and that a production of 200 to 250 GPM should be expected.

It is difficult for us to understand where they would expect to develop any appreciable amount of water; if the actual formation is as indicated by the attached log. Do you have any other log on Marcus or any information available in this immediate vicinity? We would appreciate your comments on this matter.

I have an appointment to meet Mr. L. A. Winter of Buell & Winter, Consulting Engineers, at Sioux City Friday morning, February 28.

If you have time I would appreciate if you would write to me, c/o the Martin Hotel, Sioux City, Iowa so I could have your information before calling on Mr. Winter. If you do not have time to write me I shall try to telephone you Friday morning for your recommendations.

Yours very truly,

LAYNE-WESTERN COMPANY

G. H. Beard

G. H. Beard

GHB jw Encl.

GW

Cherokee

February 26,1947

Mr. G. W. Beard
Layne -Western Company
c/o Martin Hotel
Sioux City, Iowa

Dear Mr. Beard:

We have your letter of February 25 in regard to Marcus ,Iowa and also the drillers log of the test hole recently put down for the town. As Dr. Hershey is out of town at the present time, I am replying for him. I hope this letter reaches you in time to be of use. Our control in the vicinity of Marcus is not all that could be desired; however ,a general discussion of the problem may be helpful.

From an inspection of the drillers log of the test hole drilled at Marcus, there appear to be no rocks of Creataceous age present. Although the dry blue clay reported between a depth of 261 and 596 feet seem unusually thick and may represent in part a soft shale of Cretaceous age; still a well one mile south of Marcus was apparently finished in glacial sand at a depth of 440 feet. Farther to the east at Cherokee and to the west of Marcus there are thick shale and sandstone beds of Cretaceous age above the apparent base of the drift at Marcus. Thus there appears to be an old buried valley at Marcus from which the shales and sandstones have been removed and filled with clay and in some places sand. I would hesitate to estimate the distance one would have to go in any particular direction befor one would get out of the valley and where a normal Cretaceous section would occur.

Little water may be expected in the drift at Marcus. The sands which occur generally near the base of the drift in this locality and which might yield enough water to supply the town of Marcus are likely to contain water that is highly mineralized. Certainly the log of the test hole does no indicate even a favorable bed of sand. By drilling test holes within a radius of two miles of Marcus , a shallow aquifer might be discovered which would likely contain water of fair quality; otherwise the prospect of developing a satisfactory supply from drift sands and gravels is poor.

Bedrock is reported at adepth of 596 feet in the test hole. The limestone encountered may belong to the Cedar Valley formation of Devonian age. The section below the bedrock is not known with certainty. The first 75 to 100 feet or from a depth of 600 to a depth of 675 or700 feet may contain beds of shale between limestone beds. Below a depth of 700 feet and to a depth of 1010 feet, limestone, dolomite and some chert beds should be expected. A green shale should be found between the limestone and dolomite mentioned above and the

and the underlying St. Peter formation which should be encountered at a depth of about 1075 feet. The Jordan sandstone may be expected to occur at a general depth of about 1200 feet. The rocks between the two sandstones may be expected to be mostly sandy limestone and dolomite.

The present well in use at the town of Marcus is reported to be 1300 feet deep. We do not have a log of this well nor do we possess a casing record. The well probably penetrates dolomite beds and sandstone beds below the Jordan sanstone. A few of the townspeople report that in drilling the deep well that much water was encountered above 700 feet. This may be the aquifer tapped by the test hole. Since no pumping test was conducted on the test hole it is certainly hazardous to venture a guess on the amount of water that can be obtained. Also since no water sample was collected, nothing is known of the quality of water encountered. The deep well is reported to obtain a large amount of water from the St. Peter and Jordan formations. The hardness of the water from this well is 913 parts per million calculated as equivalent calcium carbonate. The sulphate content is also high. In the well drilled to the St. Peter sandstone at Cherokee, the water had a hardness of 770 parts per million. The iron content was 8 parts per million. The attached data sheet shows the quality of the wate obtained from these two wells.

At Marcus it appears doubtful if a better quality of water can be obtained than that now used but there is apossibility that by carefully sampling the more promising aquifers,as drilling progresses, some of the more highly mineralized aquifers could be cased from the hole.

Dr. Hershey may be in the office on Friday. If you wish to call he may have some additional comments to make in regard to the situation at Marcus.

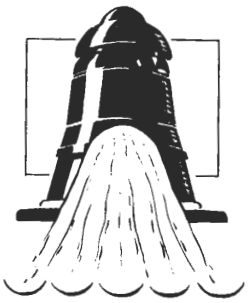
Very truly yours,

William E. Hale

Dyed Cay WEH after Thomas.

LAYNE WELLS
AND
LAYNE PUMPS

FACTORIES:
MEMPHIS, TENN.
HOUSTON, TEXAS
LOS ANGELES, CALIF.



LAYNE-WESTERN COMPANY

AFFILIATED WITH LAYNE & BOWLER, INC.

TELEPHONE KEnwood 5888

4430 COMMERCIAL AVENUE
OMAHA 11, NEBRASKA

JAN 24 1948

January 23, 1948

Dr. H. G. Hershey
Iowa Geological Survey
Iowa City, Iowa

Re: Marcus, Iowa

Dear Dr. Hershey:

We are attaching driller's log of hole being drilled for the town of Marcus.

You will note there is a slight revision of the logging in the bottom part of the hole from the log given you in our letter of January 21. This log in our letter of January 21 was from our driller's memory and given to us by telephone, however, after he referred back to his log book he has sent us complete log from the surface of the ground to the present depth of 618'.

Your co-operation in helping us establish a casing point would be very much appreciated.

Yours very truly,

LAYNE-WESTERN COMPANY

G. H. Beard

GHB/jw

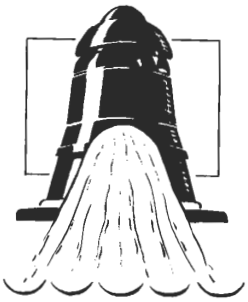
Encl.

cc: Mr. L. P. Fitzgerald
Marcus, Iowa

Buell & Winter
Insurance Exchange Bldg.
Sioux City, Iowa

LAYNE WELLS
AND
LAYNE PUMPS

FACTORIES:
MEMPHIS, TENN.
HOUSTON, TEXAS
LOS ANGELES, CALIF.



JUN 8 1948

LAYNE-WESTERN COMPANY

AFFILIATED WITH LAYNE & BOWLER, INC.

TELEPHONE KEnwood 5888

4430 COMMERCIAL AVENUE
OMAHA 11, NEBRASKA

June 7, 1948

Iowa Geological Survey
Geology Annex
Iowa City, Iowa

Attention: Mr. G. H. Hershey Re: Marcus, Iowa

Gentlemen:

Thank you for your letter of May 21 with further information relative to probable contact points on deeper formations at Marcus.

We are pleased to advise you that the well was tested when drilling reached the depth of 880'.

The static water level was 290' and the well pumped 233 GPM with a drawdown of 8'. At a depth of approximately 800' large crevices were found which probably accounts for the good production.

For your information 12" wrought iron pipe was installed from the surface of the ground to a depth of 616'. A 12" hole was carried to a depth of 657' and a 10" wrought iron liner was installed with the bottom of the liner at 657'. The length of this liner was 58' 3". A 10" hole was then drilled to a depth of 745' and 101' 11" of 8" wrought iron liner was installed with the bottom at 745'. An 8" open hole was then drilled to 880'.

We appreciate your assistance and cooperation in connection with the drilling of this well. If there is any additional information we can supply for you, please feel free to call on us.

Yours truly,

LAYNE-WESTERN COMPANY

G. H. Beard

GHB/rw