WRD Exp. (GW)
April 1966

Well No. 074-10W-27BDDD

WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

MASTER CARD

Record by D. Gockel Source of data File Date 9-8-66 Map County Highway

State Iowa (16) County (or town) Keokuk (54)

Latitude: 41 11 08 N (1) Longitude: 091 59 40 (2) Sequential number: 1 (19)

Lat-long accuracy: 2 (20) T. 074 N, R 10 W Sec 27, SE ¼, SE ¼, SE¼ 5

Local well number: Q74 10W 27BDDD (34) Other number: W-5358 B & M

Local use: Q5358 WELL #2 (51) Owner or name: Richland Town #2 Well

Owner or name: RICHLAND TOWN (66) Address: Richland, Iowa

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist — M (67)

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Mfd, (N) Ind, (P) P S, (R) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Z) Desal-other, Other — P (68)

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed — W (69)

DATA AVAILABLE: Well data 1 (70) Freq. W/L meas.: Inventory X (71) Field aquifer char. (72)

Hyd. lab. data: (73)

Qual. water data; type: Complete — C (74)

Freq. sampling: Intermittently 5-1952 I (75) Pumpage inventory: yes (no) period: (76)

Aperture cards: yes (77)

Log data: Geologist log Driller's log — G D (78 79)

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD (19) Depth well: 1870 ft 1870 (20–23) Meas. rept Driller's log accuracy 3 (24)

Depth cased (first perf.): 1370 ft 1370 (25–28) Casing type: Steel; Diam. 8 5/8 in 9 (29 30)

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (O) open end, (P) perf., (S) screen, (T) sd. pt., (W) shored, (X) open hole, (Z) other — X (31)

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 — H (32)

Date Drilled: April 1952 9 52 (33 35) Pump intake setting: 270 ft 270 (36 38)

Driller: Layne Western Co. (name), Ames, Ia. (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 — T (39) Deep Shallow D (40)

Power (type): diesel, (elec), nat gas, gasoline, hand, LP gas, wind; H.P. — 5 (41) Trans. or meter no.

Descrip. MP LSD ft above below LSD. Alt. MP 772

Alt. LSD: 772 772 (42 45) Accuracy (source): Altimeter — 7 (47)

Water Level 180 ft above (below) MP; Ft above (below) LSD 180 (48 51) Accuracy: Driller's log — D (52)

Date meas: April 1952 4 52 (53 55) Yield: 200 gpm 200 (56 60) Method determined 4 (61)

Drawdown: 20 ft 20 (62 64) Accuracy: Drlr's log 3 (65) Pumping period 5 hrs 5 (66 68)

QUALITY OF WATER DATA: Iron .8 ppm 4 (69) Sulfate 533 ppm 8 (70) Chloride 56 ppm 2 (71) Hard. 472 ppm 7 (72)

Sp. Conduct 1630 K x 10^6 5 (73) Temp. 74 °F 074 (74 76) Date sampled 5-27-52 5 52 (77 79)

Taste, color, etc.

Punched FCB

Verified ERC

Well No. 074-10W-27BDDD

Well No. 074-10W-27 BDDD

Latitude-longitude 41 d 11 m 08 s (N) S 091 d 59 m 40 s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD (1–19)

Physiographic Province: Central Lowland [12] (20–21) Section: Dissected Till Plain [E] (22) Drainage Basin: Des Moines [25C] (23–25) Subbasin: [ ] (26)

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, (L) swamp, (O) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat — upland [F] (27)

MAJOR AQUIFER: Cambrian (system), upper (series) [C3] (28–29) St. Croix Jordan (aquifer, formation, group) [SJ] (30–31)

Lithology: Med. SS [3V] (32–33) Origin: Marine [6] (34) Aquifer Thickness: ____ ft

[ ] (35–37) Length of well open to: 40 ft [40] (38–40) Depth to top of: 1830 ft [A83] (41–43)

MINOR AQUIFER: Ordovician (system), Lower (series) [81] (44–45) Lower Prairie Du Chien (aquifer, formation, group) [LP] (46–47)

Lithology: Cherty Dolo. [QD] (48–49) Origin: Marine [6] (50) Aquifer Thickness: 472 ft

[472] (51–53) Length of well open to: 460 ft [460] (54–56) Depth to top of: 1358 ft [A36] (57–59)

Intervals Screened: None

Depth to consolidated rock: 133 ft [133] (60–63) Source of data: well cuttings [C] (64)

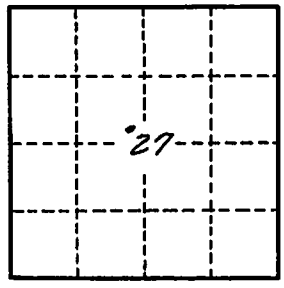
Depth to basement: ____ ft [ ] (65–68) Source of data: ____ [ ] (69)

Surficial material: ____ [ ] (70–71) Infiltration characteristics: ____ [ ] (72)

Coefficient Trans: ____ gpd/ft [ ] (73–75) Coefficient Storage: ____ [ ] (76–78)

Coefficient Perm: ____ gpd/ft^2; Spec cap: 10 gpm/ft; Number of geologic cards: ____ [ ] (79)

1370' of 8⅝" casing



Well No. 074-10W-27 BDDD

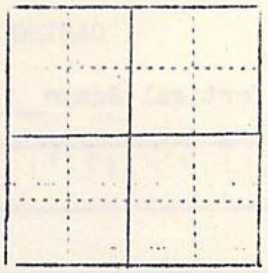
GPO 857-700

7½' Pleasant Plain Quad
411113 0915936-01
074-10W-27 BDDA
1980 field located by D. Karsten

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

No 5358

RECORD OF WELL



Location:

Town: Richland (N E / S W) :County Keokuk E.

BDDD sec. 27 T 74 N., R. 10 W. Twp.

SE SE SE NW

Well name and number Richland Town Well #2 (1952)

Owner Town Address

Tenant Address

Contractor Layne-Western Co Address

Drillers VOLPAT

Drilling dates APRIL-MAY 1952

Well data:

Elevations: Drilling curb feet; Land surface 775' feet

ANEROID FROM BENCH MARK AT MILWAUKEE DEPOT

Determined by NORTHUP

Topographic position UPLAND

Total depth: Reported 1870' feet, Measured feet

Drilling method ROTARY

Hole and casing data 1370' OF 8 5/8" CASING 0-1370

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 ANALYSES (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				
Chloride				
Sulfate				
Bicarbonate				
Hardness (ppm)				
Hardness (gpg)				

Remarks _____

Laboratory data: Sample storage location CL2-8,9, CL3-1,2.
Sample range 220-1865 No. spls. 368 No. dupls. & Cond. _____
Spls. prepared by all Washed range 220-1865 by all
Driller's log and cond. _____
Insoluble residues: Prepared by _____ Studied by _____ Strip log _____
Microscopic study _____ strip log MAY 1952
Gen. log _____ Correl. by NORTHUP

April 24, 1950

Mr. E. S. Boudinot
Brown Engineering Company
322-334 K P Building
Des Moines 9, Iowa

Dear Mr. Boudinot:

We have your letter of April 18th concerning the water supply situation at Richland and we are glad to learn that the new town council is actively considering solutions to their water-supply problem. In reply to your inquiry we have reviewed the available ground-water data on the Jordan sandstone and the depth at which the formation may be expected. The following brief discussion of the pertinent data has been taken from the open files of the Geological Survey.

There are several deep wells in this part of the State that penetrate the Prairie du Chien and Jordan formations to obtain their water supply. In most places moderate quantities of water can probably be produced from the Prairie du Chien rocks. The town of Brighton reportedly obtained 160 gallons a minute from the Root Valley and Oneota members in the lower part of the formation. At Hedrick the city well, which is completed in the Root Valley member, produced about 55 to 60 gallons a minute with a drawdown of 19 feet. The static water level in the Brighton well was 90 feet and in the Hedrick well 171 feet. Seemingly these data indicate that enough water for the town will be encountered in the Prairie du Chien formation, as you have suggested. If the yield from these rocks is inadequate for Richland, however, the Jordan sandstone in this general area is almost certain to yield large additional supplies.

The top of the Prairie du Chien formation probably will lie about 1350 feet below the surface at Richland. If the formation is about 480 feet thick, as expected, the top of the Jordan sandstone will occur at a depth of 1,830 feet. The Jordan sandstone is anticipated to be about 75 feet thick.

The following is a list of wells utilizing the Jordan sandstone as their principal water bed in this region: Morrell Packing Company, Well No. 8 at Ottumwa, Natural Gas Pipeline Company well at Harper about five miles west of Keota, North English City Well No. 2, and the Washington City wells. All these wells are cased for a considerable distance into the Prairie du Chien formation. The Morrell Packing Company well is a flowing well and the others yield between 200 and 1,090 gallons a minute. Additional water supplies may

occur in the underlying St. Lawrence dolomite if drilling is continued to greater depths.

Chemical analyses of the Prairie du Chien and Jordan waters show them to be very similar. The sulphate content normally ranges between 500 and 600 parts per million and the hardness between 425 and 700 parts per million. In addition, a moderately high concentration of iron is sometimes present.

We hope that this is the information you desired. If you have any questions or comments on this report, or if we can be of further assistance, please do not hesitate to write or call us.

Very truly yours,

H. G. Hershey

HGH:PJH:AM

Brown Engineering Company

TELEPHONE 2-8141

CONSULTING ENGINEERS

REGISTERED
PROFESSIONAL ENGINEERS

K. R. BROWN J. V. GEBUHR G. C. HAVENS
E. F. BEHRENS R. A. SCHREIBER W. E. NICHOLS
L. B. ECKLES M. T. McDONALD C. D. GIBBS
E. S. BOUDINOT J. S. VETERSNECK H. E. KELSO
G. P. PRICHETT J. M. FAIRALL

322-334 K P BUILDING
DES MOINES 9, IOWA

3

April 18, 1950

Mr. W. E. Hale
Geological Survey
Geology Annex
Iowa City, Iowa

Dear Mr. Hale:

This morning Richland called me and asked for a meeting to discuss a water program. The Town has a new Council which seems ready to do something.

In our report, we proposed two plans:

1. To Prairie Du Chien
2. Dug wells with reservoir

The second in my judgment is full of uncertainties in time of draught and not too strong a flow under the best conditions.

Should the Prairie Du Chien prove not too satisfactory, how far to the Jordan and what information do you have on the Jordan in the neighborhood of Richland?

As I recall the situation, the neighborhood of Richland is pretty short on information.

Write me your reaction to going to the Jordan in case No. 1 proves not too good.

Very truly yours

BROWN ENGINEERING COMPANY

E. S. Boudinot

E. S. Boudinot

ESB:vl

May 2, 1952

OFFICE MEMORANDUM

To: Dr. H. G. Hershey

From: R. C. Northup

Subject: Field trip to Richland, Iowa

On Tuesday and Wednesday, April 29 and 30, a trip was made to Richland at the request of Layne-Western Drilling Company to pick a casing point for the city's new water well. Operators wished to drill through the St. Peter sandstone and a few feet into the Prairie du Chien dolomite before running casing. When the writer reached the well on Tuesday morning, drilling had reached a depth of 1,310' in the Lower Platteville limestone and "Repeater" sandstone. Glenwood shale was reached at 1,322', St. Peter sandstone at 1,333', and the Prairie du Chien dolomite at 1,359'. Drilling continued to 1,370' and on Wednesday morning drilling tools were being removed preparatory to running casing. Some difficulty was being had in freeing the drill pipe from the well. The writer conferred with Mr. Sloan Munson, Layne-Western drilling superintendent who promises to keep the Survey informed as to progress on the well and any pumping tests which may be run. The present contract between the City of Richland and Layne-Western calls for a well no deeper than 1,400'. More than likely, however, the well will have to be drilled to a somewhat greater depth before completion, possibly to the Jordan sandstone.

All remaining samples to date were brought back to Iowa City. Elevation of the well was also run.

Richard C. Northup

File

May 16, 1952

Mr. E. S. Boudinot
Brown Engineering Company
322-334 K P Building
Des Moines 9, Iowa

Dear Mr. Boudinot:

We are replying to your request for information on the strata to be encountered below the St. Peter sandstone at Richland, Iowa. On the basis of subsurface work done on the well to present depth we would expect the following:

Formation and description	Thickness (ft.)	Depth (ft.) From	To
St. Peter sandstone	25	1,334	1,359
Prairie du Chien dolomite, sandstone, and some chert	451	1,359	1,810
Jordan sandstone	75	1,810	1,885
St. Lawrence dolomite		1,885	

The Prairie du Chien is divided into three members: the Willow River (or Shakopee) dolomite at the top, the Root Valley sandstone, and the Oneota dolomite at the base. The Root Valley sandstone shows considerable variation in thickness, being about 80 feet thick at Ottumwa and 140 feet at Harper. The Root Valley sandstone was reached at 1,630 feet in the Hedrick city well and apparently extends below the well which bottomed at 1,724 feet. At Richland, this sandy section should be encountered at about 1,500 feet and be approximately 100 feet thick. The lower (Oneota) member of the Prairie du Chien is a dolomite, locally sandy and cherty and generally similar to the upper (Willow River) dolomite where drilling is proceeding at present.

A large number of wells in Iowa obtain considerable water from the upper part of the Prairie du Chien formation. Where fractures are not encountered by the well, acidizing frequently opens channels for the entry of water to the well. Acidizing was not required at Wayland but was necessary at Nevada and Jefferson, Iowa.

We are interested in the progress at Richland, and if we can be of further service, please let us know.

Very truly yours,

C. Richard Murray

CRM:RCN:emh
cc: Frank Flora, Ames, Iowa

PRESENT TD = 1820', MAY 21 '52
LOST CINC @ 1820'
NOW TRYING TO REGAIN SAME BY USE OF BENTONITE. ALSO WAITING ON NEW DRILL PIPE EN ROUTE FROM K.C.
SWL = 178'

DRILLING TIME

	MIN.
1416 - 20	15
1420 - 25	15
1425 - 30	20
1430 - 35	20
1435 - 39	10
1439 - 45	20
1445 - 50	25
1450 - 55	25
1455 - 62	30
1462 - 65	10
1465 - 70	25
1470 - 75	25
1475 - 80	20
1480 - 85	20
1485 - 90	20
1490 - 95	15
1495 - 1500	25
1500 - 05	15
1505 - 08	10
1508 - 10	10
1510 - 15	24
1515 - 20	29
1520 - 25	29
1525 - 30	22
1530 - 31	3
1531 - 35	16
1535 - 40	22
1540 - 45	17
1545 - 50	15
1550 - 54	14
1554 - 55	3

DEPTH.		MIN.
1555 - 60		19
1560 - 65		28
1565 - 70		25
1570 - 75		24
1575 - 77		8
1577 - 80		12
1580 - 85		25
1585 - 90		24
1590 - 95		29
1595 - 1600		28
1600 - 05		28
1605 - 10		24
1610 - 15		30
1615 - 20		32
1620 - 23		18
1623 - 25		7
1625 - 30		28
1630 - 35		44
1635 - 40		25
1640 - 47		35
1647 - 50		15
1650 - 55		15
1655 - 60		20
1660 - 65		30
1665 - 70		25
1670 - 75		20
1675 - 80		20
1680 - 85		20
1685 - 93		40
1693 - 1700	NEW BIT	40
1700 - 05		13
1705 - 10		17
1710 - 16		30
1716 - 20		10
1720 - 25		16
1725 - 30		17
1730 - 35		20
1735 - 40		15
1740 - 45		30
1745 - 50		20
1750 - 55		25
1755 - 62		20
1762 - 65		17
1765 - 70		25

DEPTH	MINUTES	
1770 - 75	25	
1775 - 80	35	
1780 - 85	45	
1785 - 90	40	
1790 - 95	25	
1795 - 1800	33	
1800 - 08	60	
1808 - 15	55	
1815 - 20	45	LOST CIRC @ 1820
1820 - 25	63	
1825 - 27 N.D.		
1827 - 30	40	
1830 - 35	38	

DRILLERS LOG

1424 - 27 SHALE
1450 - 55 LIME - STRINGS OF SHALE
1465 - 70 WHITE LS
1470 - 1555 = SS. WITH STRINGS OF LS.
1555 - 1585 = WHITE LS.
1585 - 1590 = " " - SOME SHALE
1590 - 1650 = WHITE LS.
1650 - 1765 = WHITE LS. - STRINGS OF SS
1765 - 1775 WHITE LS. STRINGS OF SS.
DRILLED LIKE HIT CREVASES
1775 - 1830 HARD LIME ROCK
1833 - 1870 JORDON SS.

DEPTH	MINUTES
1835 - 1840	35
1840 - 45	32
1845 - 50	47
1850 - 52	19
1852 - 55	10
1855 - 60	25
1860 - 65	50

Sat. 5/25/52

Ø 1870' IN JORDAN SS.
LOST CIRC.
NOW PREPARING TO SET PUMP
AND TEST ON MONDAY 5/26

RAY HILL FARM
NE¼ NE¼ 1 - 72N - 11W
ALMOST at Township Corner
SWL OF WELL = 6.91'
TD OF WELL = 25'
BRICK CURB TO 7'
LIMESTONE CURB BELOW 7'
DIAMETER OF HOLE = 3'

SCHOOLHOUSE WELL
WEST OF JOE ETTEN'S HOUSE
SWL = 14.2'

24.0
9.8
14.2

JOE ETTEN'S WELL
SWL = 26.86 Before pumping'
SWL = 80' After pumping

50.00
23.14
26.86

STA.	TIME	ROG.	TEMP	DIFF. IN ELEV.	TEMP COR.	ADJ ROG.	BC	ELEV.
1	11:00	645	82.5				+19	664
2	11:07	760	81.5	+115	+7.5	767.5	+9	776
1	11:16	662	83.5	−98	+6.5	668.5	+2	669
2	11:30	760	83.0	+98	+6.5	766.5	0	767
1	11:45	664	89.0	−96	+7.1	671.1	0	664
2	12:00	760	88.0	+96	+7.5	767.5	5	773

772

RICHLAND TOWN WELL. - RICHLAND - KEOKUK COUNTY IOWA

LOC. SE NW SEC 27 - T 74 N - R 10 W.

APRIL 29 1952

WEATHER HOT SUNNY

B.M. = MILWAUKEE ROAD DEPOT 664'

Richland Town Test - May 26. 1952 JBC & RCN

Pump set at 270' - Elect Turbine 6" column

Attempted to set air-line. Airline broken in well

Not enough space in hole to measure w/l with

Tape or elec. line.

Started pumping 8:20 AM. pumped about 160 gpm until noon. Then surged well several times & pumped full capacity of about 270 gpm. Water cleared in afternoon. Pumped until 6:00 pm. at 270 gpm.

Temp. 72°

Discharge thru 50' of fire hose & 5' of 4" pipe with 2½" orifice.

May 27. 1952

Started pumping 8:00 AM. - Plan to test 24 hrs. pumping 200 gpm. → Water sample collected 1115 pm. Temp 73½°F.

After 24 hr. test @ 200 gpm plan to Raise pump setting to 200' from 270' & break suction to max. discharge.

Flores at Site & promised copies of driller log of pump test

Plans to set 4" column 50 gpm pump permanently in near future & we can make pump test that time.

JBC!

Keokuk Co.

To: Dr. Hershey

From: W. E. Hale

Re: Richland well

Mr. Boudinot called Sunday October 14 to request the Survey to send a representative to Richland Tuesday Morning October 16 to meet with council, probably Layne Western, and Mr. J. Dunkel of Brown Engineering Company at 10:00 am.

The discussion will largely involve the setting of casing and cementing it in. The present plan calls for setting 8" pipe from surface to just below St. Peter sandstone and cementing in lower 100 feet of pipe.

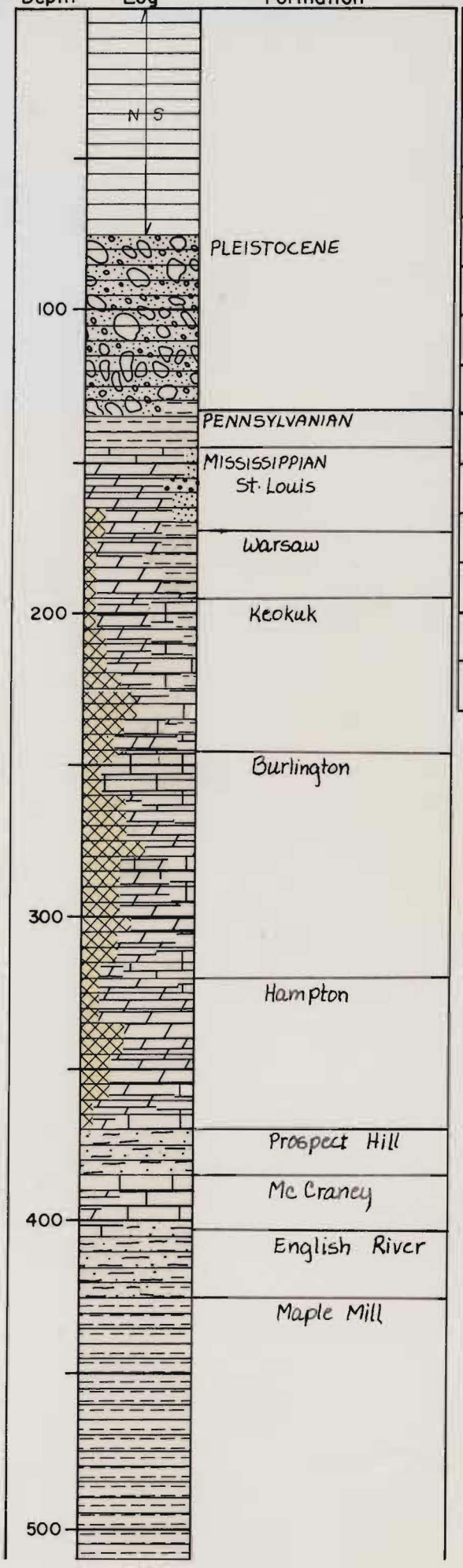
Layne Western has proposed cementing in casing from bottom to top at an additional cost of $2000. The question is, should this be done?

My thought in the matter is that it would be desirable to cement from bottom to top to protect casing against tough water in Devonian. However, cementing would not be very effective if the pipe is not centered in the hole and if the hole is not large enough to get a ring of cement at least 1-inch thick and preferably 2-inches thick around the pipe.

I told Mr. Boudinot we would arrange to have someone attend the meeting at Richland.

If this does not meet with your approval you may wish to contact Boudinot.

Gen. Data

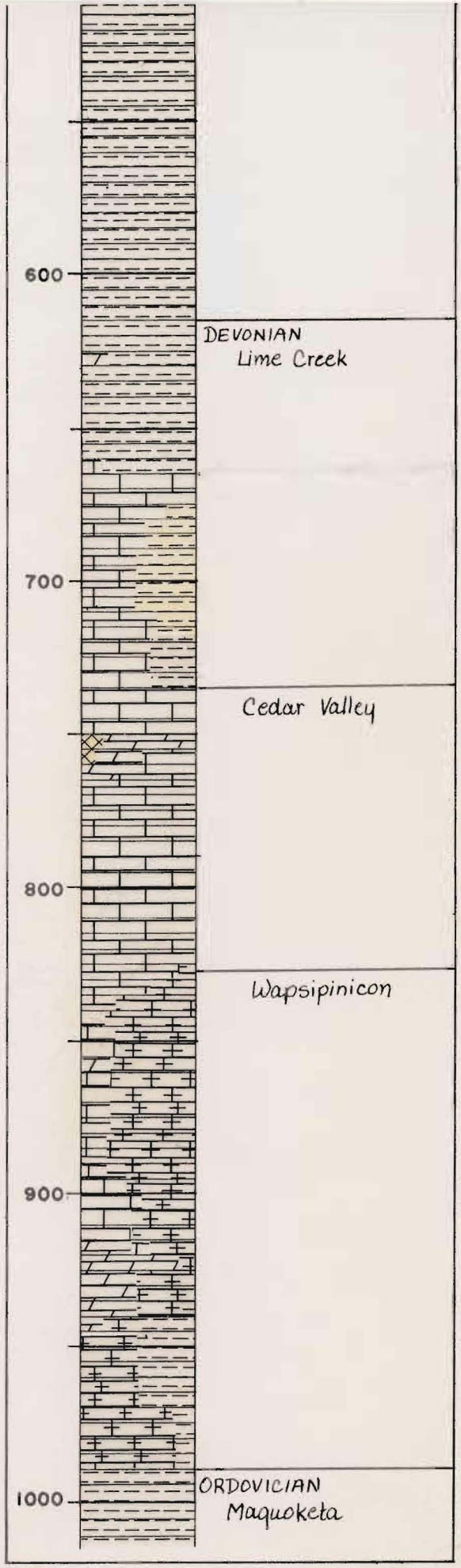


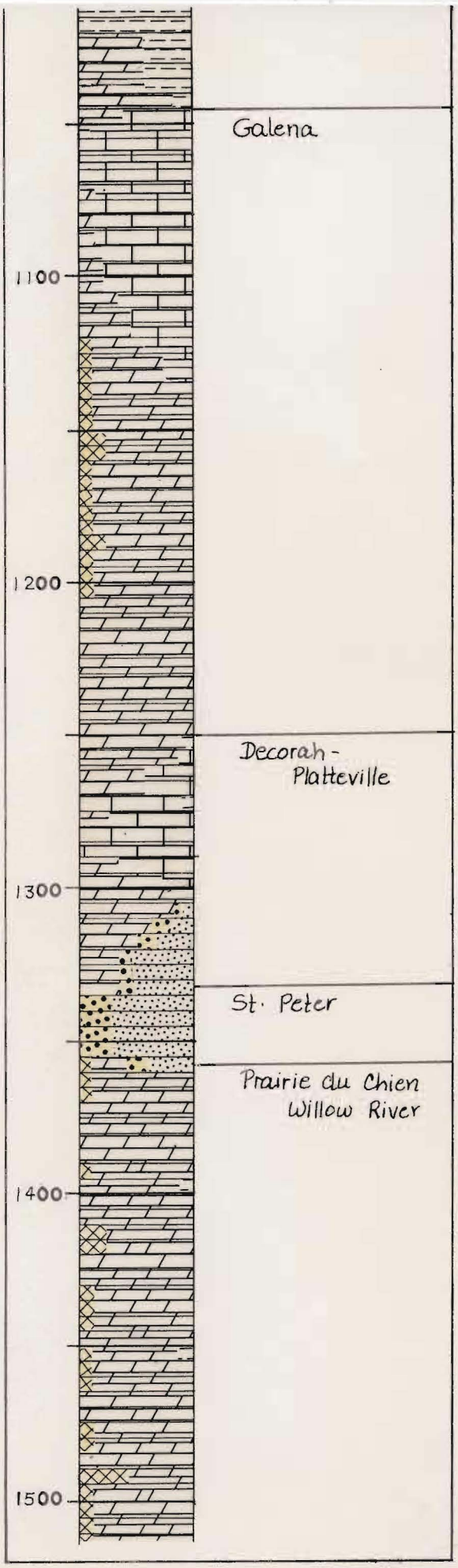
IOWA GEOLOGICAL SURVEY
In Cooperation with
U. S. GEOLOGICAL SURVEY
Iowa City, Iowa

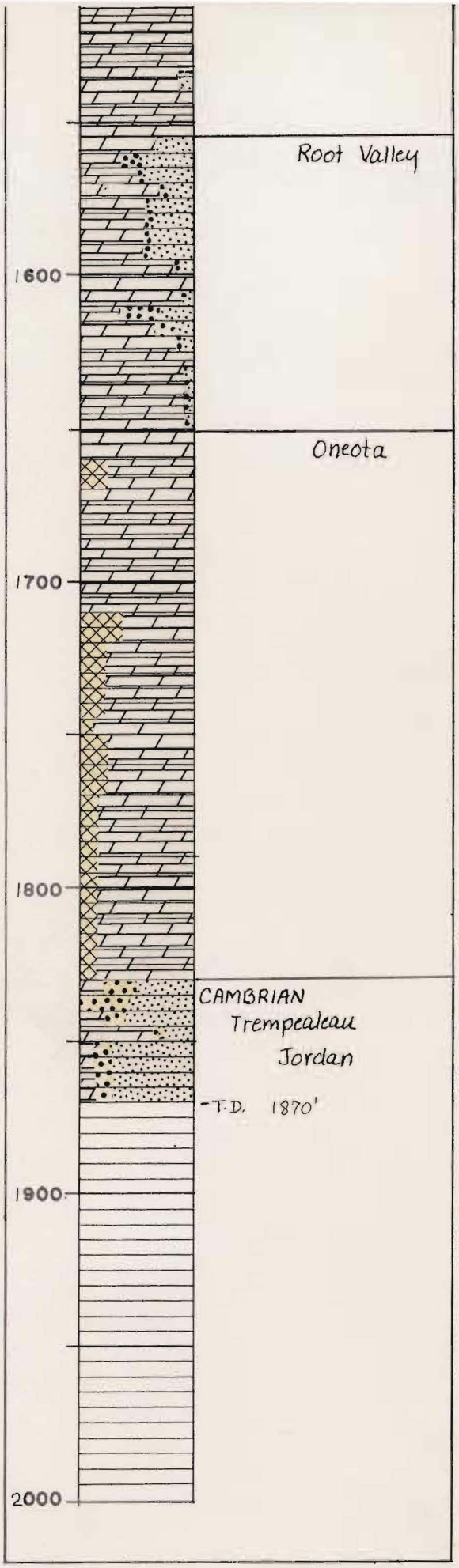
Name Richland Town Well #2 (1952)	**State** Iowa
Town Richland **County** Keokuk	**Loc.** SE Cor. NW¼
Contractor Layne-Western Co. **Driller**	**Sec.** 27
Drilling Dates April 1952	**T.** 74 **N.,R.** 10 W.
Casing Record 1370' of 8⅝" pipe 0-1370'	
S.W.L. 180 **G.P.M.** 200 **D.D.** 20	
Remarks Rotary Well	**Elev.** 772'
	T.D. 1870'
Logged By Northup May 1952	**I.G.S. No.** W-5358

Explanation of Colors

- Soil
- Loess, Silt or Siltstone
- Drift
- Sand & Gravel
- Shale
- Sandstone
- Limestone
- Dolomite
- Chert
- Gypsum or Anhydrite
- N S — No Samples


600
700
800
900
1000
DEVONIAN
Lime Creek
Cedar Valley
Wapsipinicon
ORDOVICIAN
Maquoketa


Galena
1100
1200
Decorah -
Platteville
1300
St. Peter
Prairie du Chien
Willow River
1400
1500


Root Valley
1600
Oneota
1700
1800
CAMBRIAN
Trempealeau
Jordan
T.D. 1870'
1900
2000