

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
123 NORTH CAPITOL STREET
IOWA CITY, IOWA 52242
Phone: (319) 338-1173

MEMORANDUM

To: _____

Date: _____
Southern Sioux Co.

From: _____

Re: _____
R.W.D.

W-25509 T.O: 424

Loc: 001-013 Drilled Aug-1977

W-25487-^{T.O}448

001-006 Drilled June-26-77

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MEMORANDUM

11.20

To: Don Koch

Date: 7/5/79

From: Chris

Re: phone message

from Gary Patton
of Sewell & Grant
Rock Rapids, IA

You asked for some elevations of test hole casings
and he left them with me: (Southern Sioux
Rural Water District)

fall, 1978

old 8" plastic test hole (65' TD, alluvium)

- top of casing - elevation 1268.62 100 gpm
- static water level 34' 0"

3" test hole casing in Dakota Sandstone

June, 1979

Preliminary analysis:

- 480 microns - top of casing - elevation 1268.81
- 20 grains wholeness
- Na 17
- FI .29
- Total Alk 494
- static water level 39' 3 1/2"

The casings are 145 feet apart. The Dakota test hole
is 145 feet west of the old 8" test hole.

Mr. Patton would like you to return

his call sometime today.

315 First Avenue
Rock Rapids, Iowa 51246
Telephone (712) 472-2531



Iowa Geological Survey
123 North Capital Street
Iowa City, Iowa 52242

Attention: Mr. Dan Koch

SUBJECT Re: Southern Sioux Co. Rural Water System DATE 6-29-79

Dear Mr. Koch

Enclosed is one (1) complete set of material samples collected from the Dakota sandstone test well drilled for the Southern Sioux Co. R.W.S. by Layne Western.

Mr. Dave Johnson of Layne Western will be sending to you a copy of the driller's log and electric log.

SIGNATURE

Ken Beyer

REPLY DATE

Drill cuttings, driller's log and electric log received 7-2-79

Donald L. Koch
Iowa Geological Survey

SIGNATURE

19 June 1979

Mr. David Johnson
Layne-Western Co., Inc.
4430 Commercial Ave.
Omaha, Nebraska 68110

Re: Southern Sioux County Rural Water System
Job No. 2748

Dear Mr. Johnson:

As per our telephone conversation this date, we were authorized by the Southern Sioux County Rural Water System to retain your services for the purpose of drilling one test hole. We informed the water system board members that you anticipated starting June 25.

We are sending a copy of this letter to Don Koch of Iowa Geological Survey to inform them of your starting date.

Please notify us if there is any change in your schedule.

Sincerely,

DEWILD GRANT RECKERT
& ASSOCIATES COMPANY

Ken Beyer

KB:jkv

cc: Don Koch

3/21/79
Ken called -- drilling is to start on
June 25; hole will be capped
so that we can log it when
logger is available.

6/29/70
Call from
John Madden, DeWald, Grant + Reckert
DGR
Southern Sioux Rural Water District

hole drilled and cased; 3" PVC
Layne Western, Ames
drillers log
electric log

TD 445

90' of Dakota

should make 800 - 1000 gpm

No pumping test before hearing

Hearing to be July 1st

Pumped for 5 hrs w/ air

conductivity = 650 w/ Hach kit

hardness = 14 grains

0.2 Fe

0.3 Mn

Will send cuttings by UPS for preliminary check

IGS to call INRC & provide strat-litho info.

Layne-Western Company, Inc.

A Marley Company

4430 Commercial Avenue · Omaha, Nebraska 68110 · Phone: 402/451-2388

June 29, 1979

Mr. Don Koch
Iowa Geological Survey
123 No. Capital Street
Iowa City, Iowa 52242

Subj: Southern Sioux County R.W.D.

Dear Mr. Koch:

At the request of Mr. Bruce Jennings of DeWild, Grant, & Reckert, I am enclosing one copy of our test logs and a copy of the electric log for a test hole near Maurice, Iowa. This test hole was drilled into the Dakota Sandstone during the week of June 25, 1979.

I hope the enclosed information is of use to you and should you have any questions concerning the above or the enclosed, please contact me at our offices.

Very truly yours,

LAYNE-WESTERN COMPANY, INC.


David L. Johnson, P.E.

DLJ:1mb



— WATER SUPPLY SERVICES —

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123 NORTH CAPITOL STREET
IOWA CITY, IOWA 52242
Phone: (319) 338-1173



IOWA
a place to grow

Stanley C. Grant
Director and State Geologist

Orville J. Van Eck
Associate State Geologist

Donald L. Koch
Assistant State Geologist

June 13, 1979

Mr. Gary Patton
DeWild, Grant, Reckert & Associates Company
315 First Avenue
Rock Rapids, Iowa 51246

Dear Mr. Patton:

I am glad to reply to your letter of June 5 concerning information on ground-water availability from the Dakota Sandstone and deeper formations at the Southern Sioux County Rural Water System's proposed well field in the NW $\frac{1}{4}$ sec. 4 and NE $\frac{1}{4}$ sec. 5, T.93N., R.45W., Plymouth County, Northeast of Struble, Iowa.

A generalized log of the formational units anticipated beneath this location down to the top of the Precambrian crystalline rocks is outlined as follows (all depths are referred to an assumed surface elevation of 1265 feet above sea level):

<u>Formation</u>	<u>Depth Range (Ft.)</u>
Quaternary System	
Recent deposits (alluvial and terrace sand and gravel, some clay)	0 - 65 ⁺
Pleistocene glacial drift (clay, locally containing sand and gravel bodies)	65 ⁺ - 115
Cretaceous System	
Graneros Shale	115 - 165
Dakota Sandstone, probably includes some inter-bedded shales	165 - 540
Ordovician System	
Galena Formation (dolomite)	540 - 560
Decorah-Platteville Formations (mostly shale, some limestone)	560 - 675
St. Peter Sandstone	675 - 710
Cambrian System	
Dresbach Formation (alternating dolomite, shale, and sandstone beds)	710 - 865
Precambrian System	
Undifferentiated metamorphic rocks	865 -

These depth estimates are based on available well logs from the surrounding area and our subsurface maps. The estimates are reasonable but some allowance for error is in order owing to local structural and thickness variations of the strata.

Copies of a few of our nearest well logs including municipal wells at Maurice and LeMars are enclosed. It is unfortunate that no logs are available closer to the project site. As nearly as I can determine, the Dakota Sandstone will have a cumulative thickness of about 300 feet in this locality. Some shales generally are interbedded with the sandstone. The outlook seems fairly good that as much as 500 to 1000 gpm can be obtained from this source based on the results at the LeMars well, the Sioux-Preme Packing Company wells at Sioux Center, a test at Orange City, and two pumping tests conducted by the Iowa Geological Survey on private wells for research purposes. These are the Loren Hanson well about 23 miles north of Struble in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 28, T.97N., R.46W., Sioux County, and the Larry Ritz well about 15 miles southwest of Struble in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 31, T.92N., R.47W., Plymouth County.

The LeMars (Iowa Public Service Company) wells reportedly are capable of delivering 700-950 gpm. The Sioux-Preme Packing Company wells delivered 400-500 gpm, while the driller of the Orange City test said it probably could produce 500 gpm. In 1975 Maurice had a well drilled to about 500 feet that is pumped at about 140 gpm. This well probably could produce larger quantities of water but no data were supplied on the initial pumping test.

The Loren Hanson well near Rock Valley and 596 feet deep appears to have reached the Precambrian rocks. However, the Dakota aquifer which is in direct contact with the Precambrian here is the principal source. The pumping test ran for 60 hours and produced 1000 gpm with a drawdown of 59.5 feet from a static water level of 169.3 feet. Transmissivity (T) was calculated at about 30,000-60,000 g/d/ft and storage (S) at about $0.9-1.3 \times 10^{-3}$. T was higher at the pumping well than in the observation well and 22 feet of the drawdown was attributed to a well loss factor from well inefficiency. Therefore, T probably is about 30,000 g/d/ft and the specific capacity might be about 17 gpm/ft. of drawdown taking into account the well loss.

The Larry Ritz well is variously reported to be 455, 500, and 540 feet deep. A pumping test of 22 hours duration showed a static water level of 154 feet and a pumping water level of 191 feet while delivering 881 gpm. That is a specific capacity of about 24 gpm/ft. Our evaluation of the test data indicates that $T=55,000$ g/d/ft in the production well and $T=57,000$ in the observation well. S was about 1.0×10^{-4} . There was a well loss of about 3.5 feet in the production well perhaps due to partial penetration of the aquifer. This accounts for the lower T value in the production well than in the observation well.

These differences in T seemingly are a normal situation for a sandstone aquifer where grain size and permeability may vary locally. Thus I cannot state definitely that as much as 825 gpm (peak demand) can be developed from a single well into the Dakota Sandstone at the Southern Sioux County Rural Water System site. However, the prospects seem good that two wells will produce the desired quantity. A separation distance of a quarter-to half-a-mile is preferred to reduce the interference effects. The water is expected to be acceptable for human consumption although extremely hard (750 mg/L) and high in sulfate (550 mg/L). The static head of the aquifer should be about 1175 feet above sea level or about 90 feet below the estimated surface elevation of 1265 feet.

Additional water-yielding zones are likely to occur in the underlying dolomite and sandstone units down to the base of the Precambrian rocks. However, there is very little supportive data and the section seems to contain a high percentage of shale. Therefore, the potential of these deeper formations is highly uncertain.

In conclusion, the general outlook is promising that two wells penetrating the Dakota Sandstone will yield enough water for the 24 hour average supply requirement of 550 gpm and probably for the peak demand of 825 gpm. Some interference should occur with private wells completed in the same aquifer within a radius of a mile or so but this isn't expected to be serious. A pumping test with at least one observation well will provide the most reliable data.

I hope this is the information you wished. Feel free to call or write if you have any questions remaining on this matter.

Sincerely,

Paul J. Horick
Senior Ground Water Geologist

cc: Louis F. Gieseke, INRC

Enclosure

PJH/jk

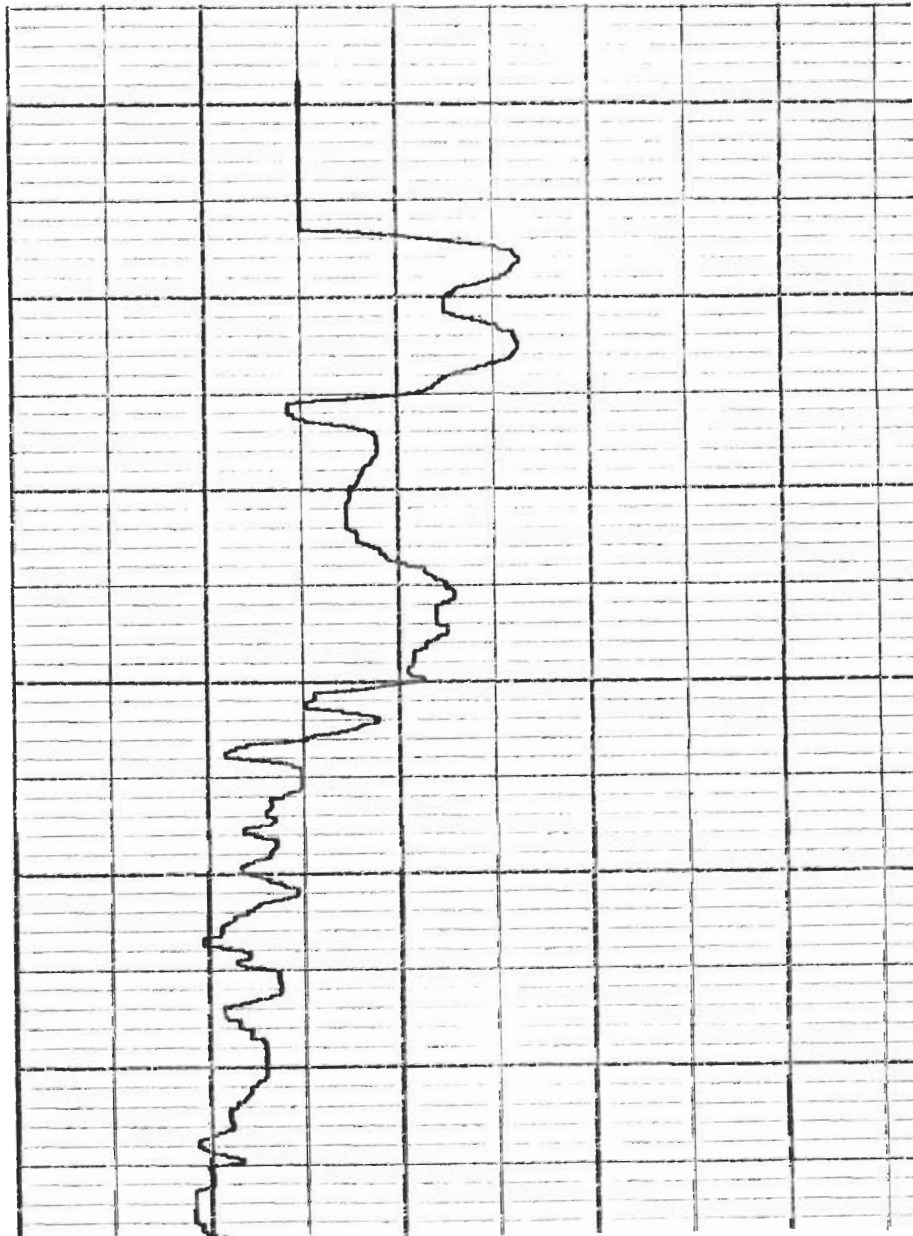
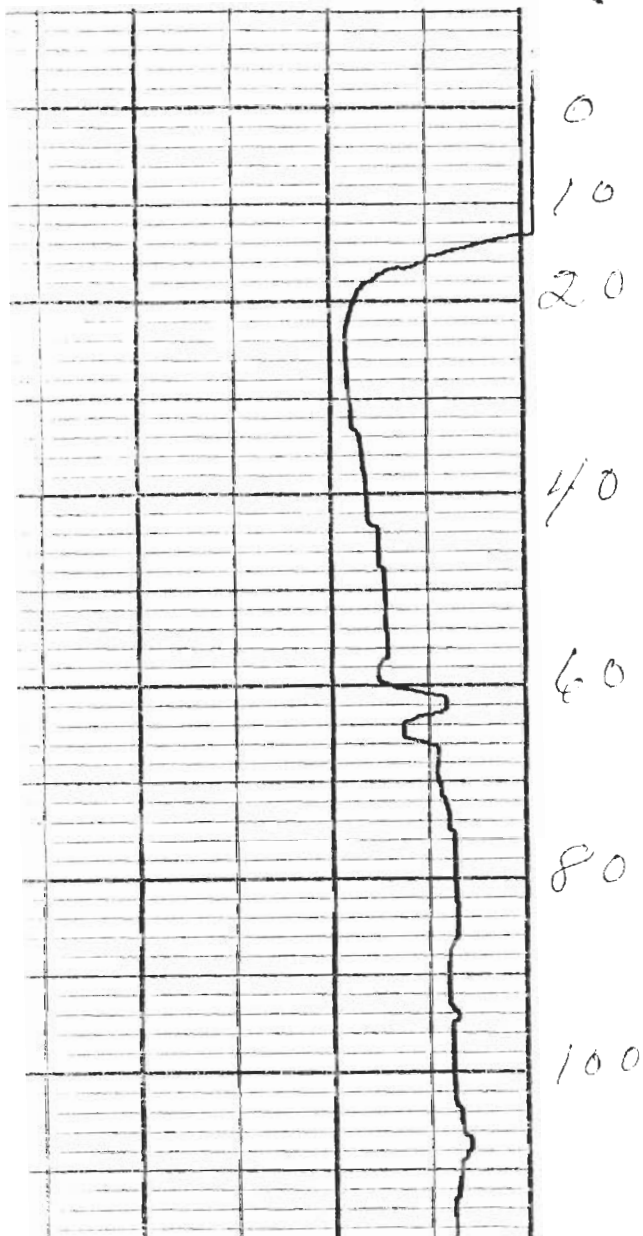
Layne-Western Company

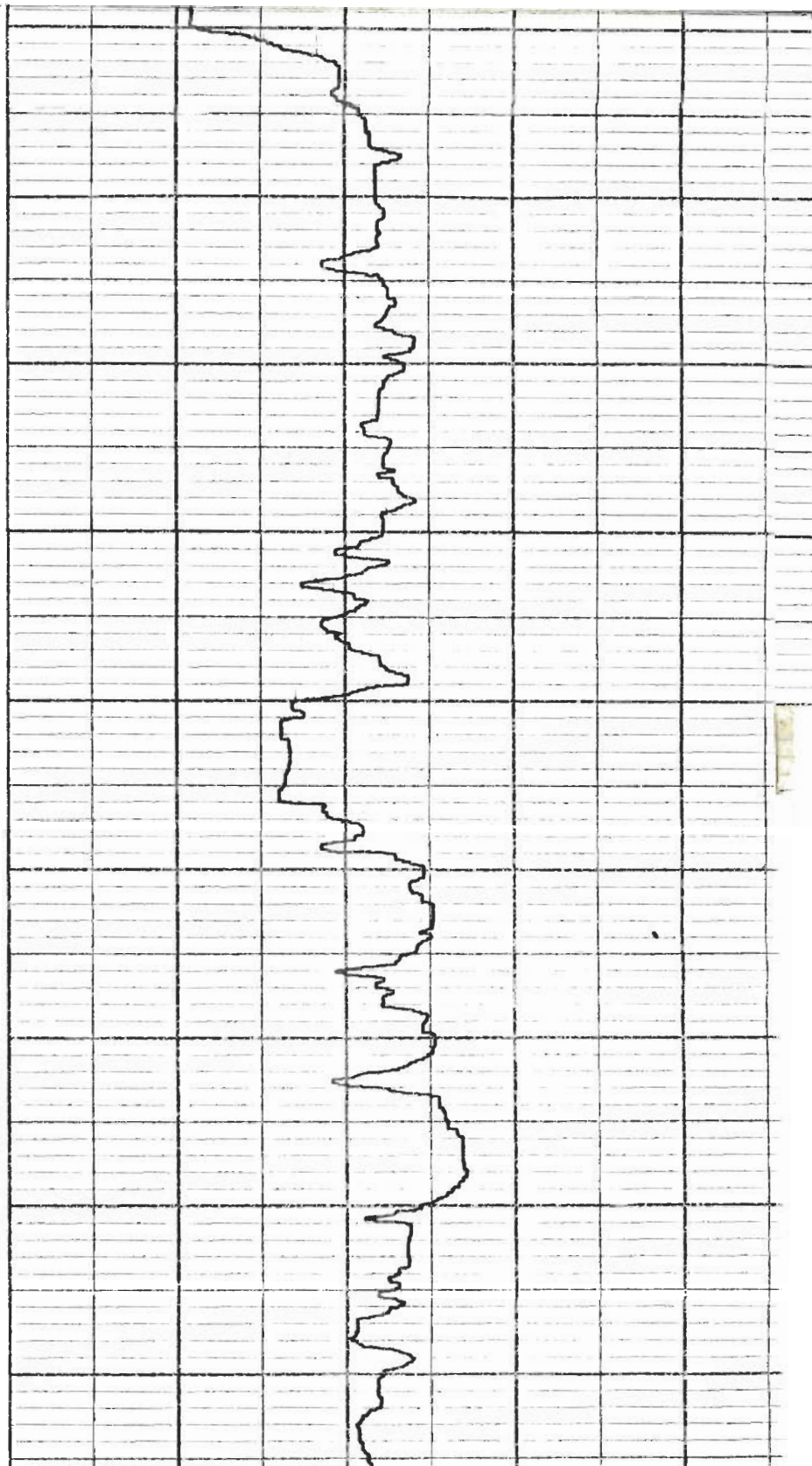
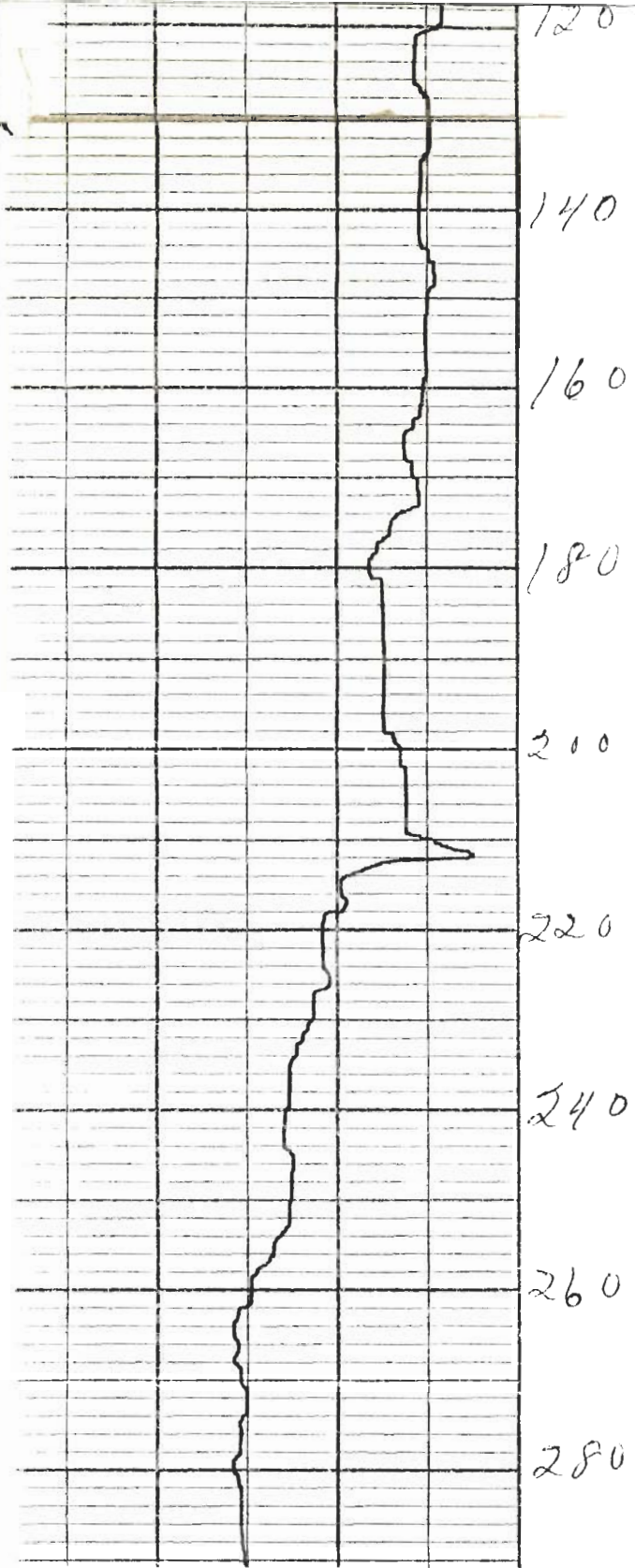
ELECTRICAL LOG

4430 Commercial Ave.

Omaha, Nebraska

CUSTOMER		So. Sioux Co. R.W.D.		ADDRESS		Maurice	
WELL NO.		#79-1		COUNTY		So. Sioux	
LOCATION		ZERO ELEVATION		STATE		Iowa	
Date	6-26-79	Resistivity Scale: 1"	10 OHMS	Nature of Mud	Bentonite	pH	
1st Reading	10'	Potential Scale: 1"	5 MV	Density		Circ. Temp.	
2nd Reading	448'	Lineal Scale: 1"	20'	Viscosity	36 Sec.	Weather	
Voltage Logged		Casing (Driller)	none	Bottom (Driller)		Logged by	D. Oseka
Casing Size:	4"	Casing Size		Casing (From Log)		Witnessed by	B. Harris
REMARKS Estimated capacity - 800 to 1000 GPM							





300

320

340

360

380

400

420

440

447'

