W1268

IOWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey
RECORD OF WELL

Location:

Town: TOLEDO (NE) (SW) County TAMA

SESESW sec. 15 T. 83 N., R. 15 (E) (W) Twp.

Well name and number

Owner TOLEDO CITY WELL #7 (DEEP) Address

Tenant (1961) Address

Contractor HOEG & AMES Address LINCOLN, IOWA

Drillers LEROY AMES - BOYD IRWIN

Drilling dates JAN 23 - JULY 19, 1961

Well data:
Altitudes: Drilling curb ____ feet; Land surface ____ feet 850' +

Determined by

Topographic position

Total depth: Reported 2016' feet; Measured ____ feet

Drilling method CABLE TOOLS

Hole and casing data 500' OF 16" CASING 0-500'
1475' OF 12" CASING
WELL ACIDIZED WITH 8000 GALLONS 15% HCL

Original depth to water 163' above ft. below Date

Source of data

Sources of water: Principal ONEOTA - JORDAN - ST. LAWRENCE

Others

PRODUCTION DATA AWCI

Date

Static water level 163'

Pumping water level 365' @ 900+ GPM

Yield (g.p.m.) ? 1200 GPM ON LATER PUMPING TEST

Measuring point

Duration of pumping 26 HOURS

Specific capacity

LABORATORY DATA TL4-[redacted]95,96,97,98,99

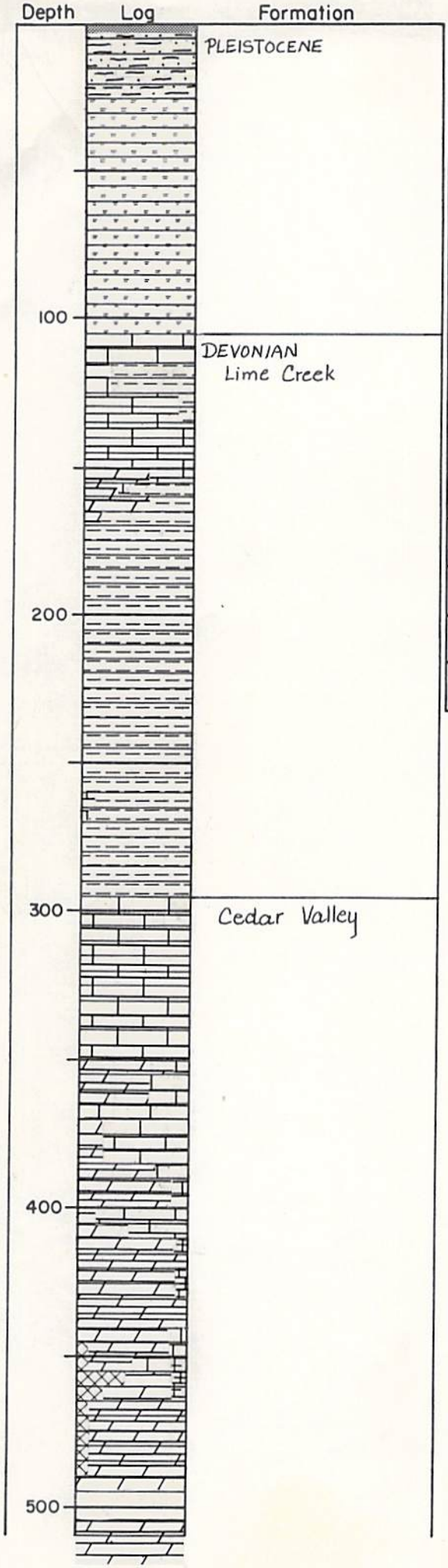
Well No. [redacted]12687 Sample range 0-2000 No. of samples 401

No. of dupls. and cond. 398 Good Washed range 295-2000

Samples prepared by Date

Logged by NORTHUP Date JAN-JUNE 1961

Correlations by Date

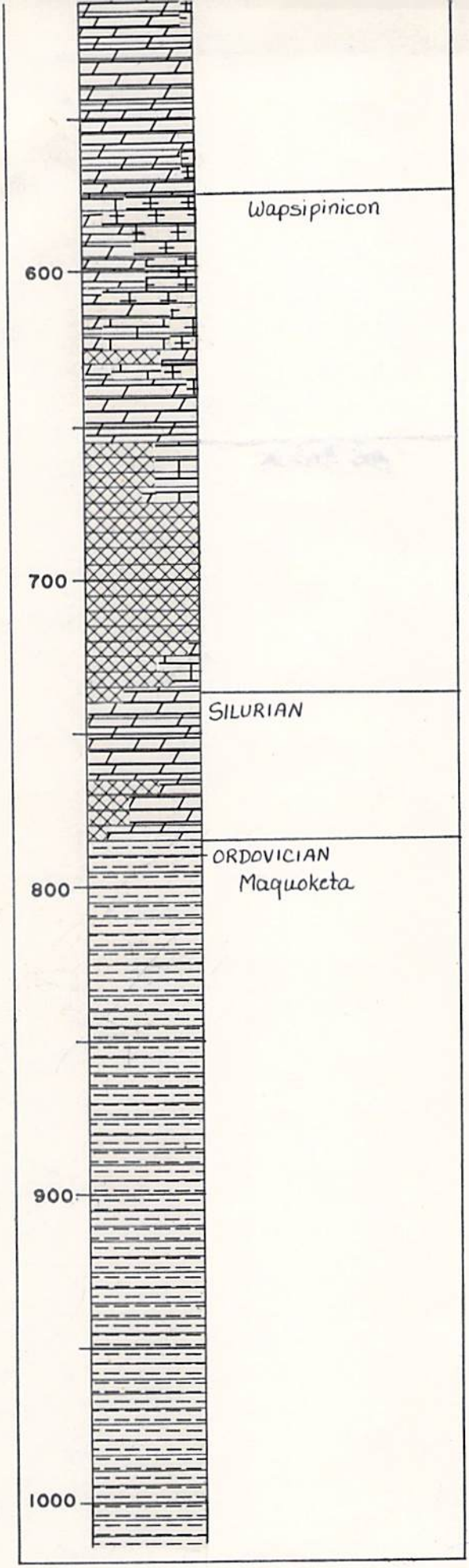


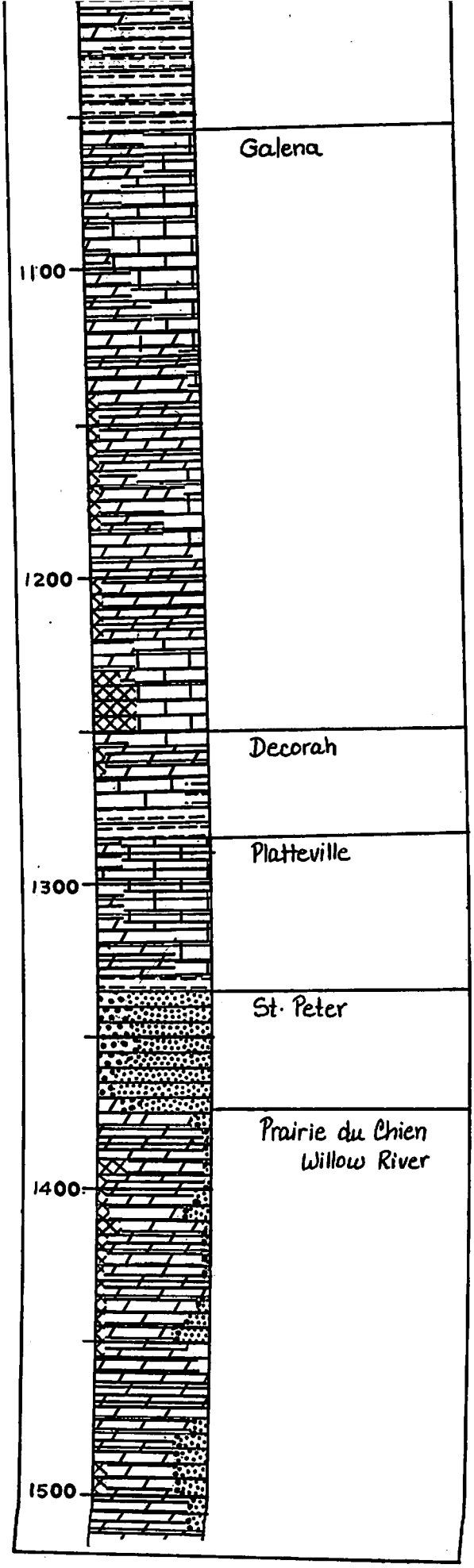
IOWA GEOLOGICAL SURVEY
In Cooperation with
U. S. GEOLOGICAL SURVEY
Iowa City, Iowa

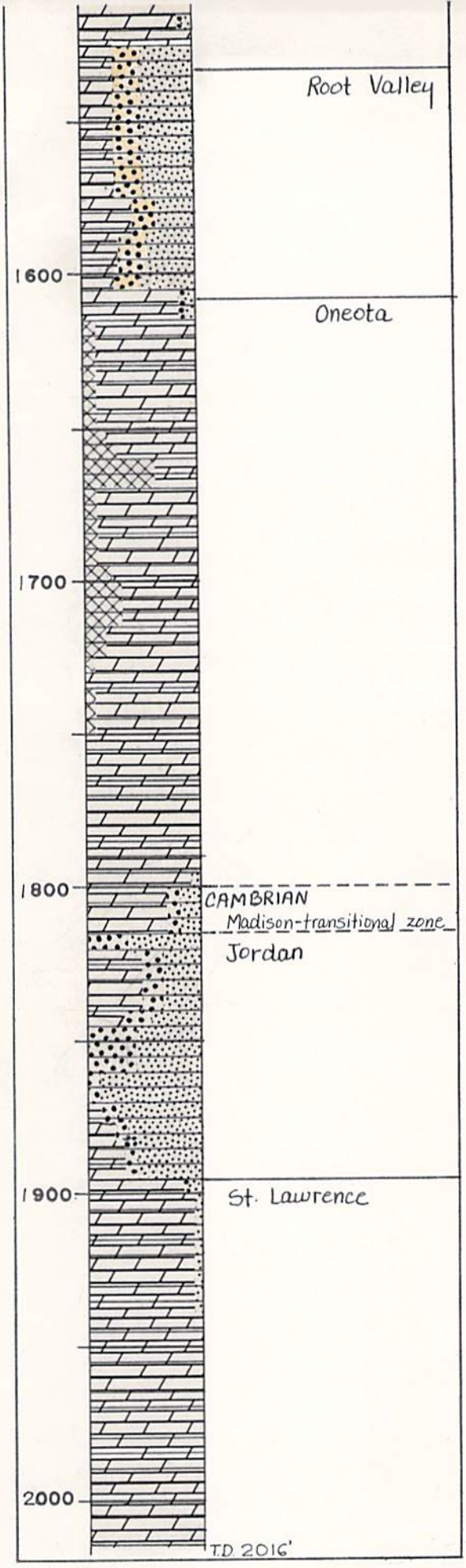
Name: Toledo City Well #7	State: Iowa
Town: Toledo — County: Tama	Loc.: SE SE SW
Contractor: Hoeg & Ames — Driller:	Sec. 15
Drilling Dates: Jan. 23, 1961 - July 19, 1961	T. 83 N., R. 15 W.
Casing Record: 500' of 16" csg. - 0-500'	
985' of 12" csg. - set at 1475'	
S.W.L. 163' — G.P.M. 900+ — D.D. 202'	
Remarks: Temp.: 64° F Acidized with 8000+ gal. HCL (1 tank car)	Elev. 850
Main water Oneota, Jordan, St. Lawrence	T.D. 2016
Logged By: Northup 1961	I.G.S. No. W-12687

Explanation of Colors

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


Wapsipinicon
600
700
SILURIAN
ORDOVICIAN
Maquoketa
800
900
1000


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


Root Valley
1600
Oneota
1700
1800
CAMBRIAN
Madison-transitional zone
Jordan
1900
St. Lawrence
2000
T.D. 2016'

coded

STATE HYGIENIC LABORATORY, DES MOINES BRANCH
WATER LABORATORY DIVISION
MINERAL ANALYSIS

LAB. NO. 263
MINERAL NO. 3057
August 9 19 61

TOWN Toledo COUNTY Tama

OWNER OF SUPPLY City of Toledo
COLLECTOR'S NAME Iowa Geological Survey - R C
DATE COLLECTED 1 August 1961 DATE RECEIVED 8 August 1961
REPORT TO: NAME Iowa Geological Survey
ADDRESS Geology Annex
Iowa City, Iowa

FIELD DATA

SOURCE: WELL NAME, NUMBER, POINT OF COLLECTION, DEPTH, CONSTRUCTION DATE, ETC., Toledo City Well #7 (deep well) drilled 1961, collected at point of discharge 125' from well

WELL PUMPED 25 HRS. AT 1200 GPM. DATE OF PREVIOUS SAMPLE
WAS SAMPLE FREE OF TURBIDITY WHEN COLLECTED Yes
TEMPERATURE °C 64 F ALKALINITY (ppm $CaCO_3$) P T pH
IS A POLYPHOSPHATE BEING USED?

LABORATORY ANALYSIS
(PARTS PER MILLION)

SPECIFIC CONDUCTANCE K AT 25°C 112 x 10^{-5}. TURBIDITY
DISSOLVED SOLIDS SOLUBLE IRON (Fe)
TOTAL SOLIDS SILICA (SiO_2) TOTAL IRON (Fe)
ALKALINITY (ppm $CaCO_3$) P None T 310 pH 7.2 DATE 8 August 1961

POSITIVE IONS		NEGATIVE IONS	
K^+		NO_3 — asN	
Na^+		F^-	
Ca^{++}		Cl^-	25
Mg^{++}		SO_4^{--}	
Mn^{++}		HCO_3^-	
Al^{+++}		CO_3^{--}	

HARDNESS AS $CaCO_3$ ppm gpg
Sample appeared clear on receipt in lab with small amount of white sand settling to bottom of container. Not filtered for mineral analysis.
Preliminary report as requested. Includes transient determinations and chloride

ANALYST Sheriff, Ryan

R. L. MORRIS
PRINCIPAL CHEMIST

copies bw have been sent to Hoeg & Ames Collins Engrg Co

GW Toledo city well folder Tama Co. current file

July 15, 1975

Mr. Don Stoekoer, P.E.
Howard R. Green Company
Green Engineering Building
417 Fist Ave., S.E.
Cedar Rapids IA 52401

Dear Don:

Enclosed is a copy of the log on the Toledo City Well #7 (I.G.S. No. W-12687) and a copy of correspondence to Mr. Ralph Russell of your firm dated March 27, 1974. Mr. Russell probably received the same log copy.

Sincerely,

Donald L. Koch
Assistant State Geologist

DLK/rs
Enclosure

GI. Iowa City
CB

March 3, 1961

TO: Dr. H. G. Hershey
FROM: Richard C. Northup
SUBJECT: Trip to Dysart and Toledo

A trip was made on Friday, March 3, to check on drilling at the new town wells at Dysart and Toledo. No further progress has been made at Dysart since my last visit there on January 31. At that time drilling had reached 955' in the Galena and an intermediate string of casing had been stuck. The casing was finally freed, and the hole reamed out to accomodate the pipe, but then the Maquoketa shale caved badly and bridged the hole several times. Today (March 3) Harry Lewis was on the job for Varner, cleaning out the hole, and he hopes they will have it cleaned out ready for the casing by sometime next week.

Toledo has reached a depth of 851' after a minor fishing job yesterday. I visited with Whitey Rhodes, Leroy Ames, and also with Sylvan who dropped by. After I have run the latest samples, they would appreciate a revised forecast, which I promised them. Sylvan also discussed the casing point problem at New London with me. He, too, has had his share of trouble with the Engineering Company and has found them somewhat hard to satisfy. Obviously they know nothing about well construction.

3/25/61 Was this done? N

DONE - R.C.N.

RCN

July 20, 1961

TO: H. G. Hershey
FROM: L. L. Steele
RE: Pumping test of Toledo City (Jordan) well, July 19, 1961

The pumping test of the Toledo city well was started at 8 a.m. July 19, 1961 by Hoeg and Ames, drilling contractor. This test was by the step-drawdown method and will continue until water becomes clear of sand.

Data pertinent to the test and construction of the well are as follows:

Drilling dates: January 23, 1961, July 15, 1961
Contractor: Hoeg and Ames
T. D.: 2000 feet (2016 feet)
Location: SE, SW sec. 15, T. 83 N., R. 15 W., Tama County

Casing Data

500' of 16" casing 0-500'
1475' of 12" casing set at 1475'

Acidized with 7,000-8,000 gallons

Pump Data

Pump: gasoline powered turbine. Bottom of pump and suction pipe, 430'. Water level measured by electric line and air line set at 385 feet.

Discharge measured by 2 foot rectangular weir and circular 8" orifice in 12' pipe.

August 9, 1961

Pumping Test, Toledo City Well No. 7 July 31-August 1 1961

Location: Se $\frac{1}{4}$ Se $\frac{1}{4}$ Sw $\frac{1}{4}$ sec. 15, T. 83 N., R. 15 W., Tama County
Total Depth: 2016 feet
Elevation of land surface datum: Approximately 850'
Contractor: Hoeg & Ames, Lincoln, Iowa
Engineer: Eldon Collins, Marshalltown, Iowa
Date Drilled: 23 January - 19 July 1961
Casing Data:

Size	Amount	Depth to Bot. Pipe	Depth to Top Pipe
16"	500'	500'	0'
12"		1475'	

Water Level: Static water level was 156.0' below top of casing which was approximately 2' above land surface.

Test Pump: Turbine powered by diesel with direct drive

Aquifer: Praire du Chien, Jordan, St. Lawrence

Measurements: Water level by electric line; discharge by circular orifice weir.

Observer: R. B. Campbell

March 8, 1961

Mr. Sylvan Ames
Hoeg & Ames, Inc.
Lincoln, Iowa

Dear Mr. Ames:

In response to your request we are pleased to send you a revised forecast for the new Toledo well after studying the samples to a depth of 850' which is 65' into the Maquoketa shale. Assuming that the total thickness of the Maquoketa and underlying formations remain essentially the same as in our original forecast and after comparing the section again with the Central Fibre Products Company wells at Toledo, the remaining formations and comtemplated total depth of the well should run about 40 to perhaps 50' lower than in our original estimate. This, in turn, may be subject to some minor revision if there should be a thickening or thinning of the Maquoketa. However, this should not vary much from the thickness at Tama.

We will, of course, keep up with the drilling at Toledo and hope we can provide further help as problems arise. If you have any questions on the enclosed forecast, please feel free to write or phone us.

Very truly yours,

H. G. Hershey

RCN/jsm
Enclosure

REVISED FORECAST FOR TOLEDO CITY WELL FROM MAQUOKETA SHALE TO ST. LAWRENCE DOLOMITE

Formation	Thickness (ft.)	Depth Range (ft.)
Ordovician system		
Maquoketa formation (shale, some dolomite in lower part)	275	785-1060
Galena formation (limestone and dolomite with lower part slightly cherty)	215	1060-1275
Decorah-Platteville formations (limestone and dolomite, minor shale in upper part)	65	1275-1340
Glenwood shale	5	1340-1345
St. Peter sandstone	35	1345-1380
Prairie du Chien formation (dolomite, sandy in upper part, cherty in lower part, sandstone bed in middle)	460	1380-1840
Cambrian system		
Jordan sandstone	80	1840-1920
St. Lawrence dolomite	200±	1920-2120±

Tama Cty.

April 21, 1961

Mr. W. H. Rhodes
Hoeg & Ames
Lincoln, Iowa

Dear Mr. Rhodes:

As a result of your recent visit we have checked the drilling samples from the new Toledo municipal well now being constructed and find that it follows our forecast very closely. This being so, it would appear that the desired casing point can be predicted to be at or near a depth of 1475 feet.

As you probably know the estimate made above could be refined if sufficient time were available to thoroughly study the samples as their depth is reached. Because the casing point must be deep enough to completely exclude all higher waters, we try to make our estimates on such matters carry a safety factor.

Please let us know when we can be of further service.

Very truly yours,

H. G. Hershey

CNB/jsm

Toledo City
Tama Co.

August 8, 1961

MEMO

TO: Dr. H. G. Hershey
FROM: Russell Campbell
RE: Pumping test of the Toledo City well, July 31-August 1961

The pumping test on the Toledo City well No. 7 (deep well) commenced at 7:00 Monday morning July 31, 1960 at a rate 1200 g.p.m. and continued at this rate until 8:00 Tuesday morning August 1, 1961. The pump was then stopped and the well was allowed to partially recover until 12:00 noon, at which time pumping was resumed at a rate of 508 g.p.m. until 3:32 that afternoon. The well had been allowed to recover from previous pumping for two days, Saturday and Sunday 29-30 July. Data were recorded from the 25 hour test at 1200 g.p.m. by personnel of Hoeg & Ames and the remaining observations were made by myself.

To summarize the attached data; the well was pumped at a constant rate of 1200 g.p.m. for 25 hours. The static water level was 156.0' and the pumping level after 25 hours was 372.90', giving a specific capacity of about 5.5 gallons per minute per foot of drawdown ~~under these conditions.~~ The pump was then stopped and the well recharged for 4 hours, with the water level returning to 189.35' below the top of the casing, 33.35' below original static level. The pumping was then resumed at a constant rate of 508 g.p.m. for 3 hours and 32 minutes at which time the pumping level was 238.17'. The drawdown, taken from the original static level was 82.17', giving a specific capicity of about 6.2 g.p.m./ft. under this new set of conditions.

A water sample was taken at 7:50 a.m. Tuesday, after the well had pumped at a rate of 1200 g.p.m. for 24 hours and 50 minutes.

A copy of the well log has previously been sent to Hoeg & Ames at Lincoln, Iowa, and to Mr. Eldon Collins, engineer, at Marshalltown, Iowa. Both parties have also requested copies of the pumping data and mineral analysis.

Layne Co.

September 8, 1961

Mr. Sylvan Ames
Hoeg & Ames
Lincoln, Iowa

Dear Mr. Ames:

We inclose the results of the pumping test on the Toledo deep well.

To summarize the attached data; the well was pumped at a constant rate of 1200 g.p.m. for 25 hours. The static water level was 156.0' and the pumping level after 25 hours was 372.90' giving a specific capacity of about 5.5 gallons per minute per foot of drawdown. The pump was then stopped and the well recharged for 4 hours, with the water level returning to 189.35' below the top of the casing, 33.35' below original static level. The pumping was then resumed at a constant rate of 508 g.p.m. for 3 hours and 32 minutes at which time the pumping level was 238.17'. The drawdown, taken from the original static level was 82.17', giving a specific capicity of about 6.2 g.p.m./ft. under this new set of conditions.

If we can be of further service please let us know.

Very truly yours,

H. G. Hershey

CNB/nai

file - Tama Co - GW
Toledo Gen data

IOWA STATE
DEPARTMENT OF HEALTH

Public Health Engineering

Paul J. Houser, M. S.

September 27, 1961

Dr. Brown took
care of this.

Mr. Ernest Mayo
Water Superintendent
Toledo, Iowa

Dear Sir:

We are writing in regard to your letter, dated September 20, 1961, requesting a copy of the mineral analysis from your new Jordan well.

We have delayed answering your letter pending the receipt of the mineral analysis reports from the Branch Office of the State Hygienic Laboratory. Our copies of the mineral analysis report from this well were received in this office on September 26, 1961.

In reviewing the reports in this office, it was noted that the samples were collected by the Iowa Geological Survey. As a result, the Iowa Geological Survey will make the distribution on these reports. Your city's copy of the mineral-analysis report should be received within the next couple of days if it is not already in your files.

If this Department can be of further service to you, please feel free to request such further information or assistance directly from this office at any time.

Very truly yours,

DIVISION OF PUBLIC HEALTH ENGINEERING

A. L. Bennett
Public Health Engineer

DRA:ww
cc: Mr. Paul R. Yetter, Town Clerk, Toledo
Mr. H. G. Hershey, Director, Iowa Geological Survey, Iowa City

M E M O

October 4, 1962

To: O. Van Eck
From: H. G. Hershey

Mr. Eldon Collins, Collins Engineering Company, Marshalltown (Phone-Marshalltown 2-0859) has requested a dissolved oxygen determination on the water from the new Toledo well. Apparently this originated with Dr. Robert Morris, Head of the State Water Laboratory.

Arrangements have been made for you to pick up Dr. Morris in an Iowa Geological Survey car at 9:00 A.M., Tuesday, October 9 and proceed with him to Toledo and return. He will be ready to go with equipment at the south double door of the Medical Lab., but you should phone him Monday to make final arrangements at 8-0511, Extension-2128.

You should be ready with full information regarding the well, and your ingenuity sharpened to a pin-point or finer to help solve this vexing problem.

Mr. Jack Clemmons is Superintendent of Public Utilities (or similar title) at Toledo.

HGH/bjm

State University of Iowa

State Hygienic Laboratory

ENVIRONMENTAL SANITATION
MICROBIOLOGY
SEROLOGY

MEDICAL LABORATORY BUILDING • IOWA CITY, IOWA

In cooperation with IOWA STATE DEPARTMENT OF HEALTH

12 October 1962

Dr Garland Hershey
State Geological Survey
University of Iowa
Iowa City, Iowa

ANALYTICAL SURVEY ON NEW WELL AT TOLEDO, IOWA

Dissolved oxygen analysis was performed on five samples collected at various intervals over a three hour pumping period at Toledo, Iowa and they were found to contain no dissolved oxygen. It was determined by conversation with the various people at Toledo that the visible amount of white water had markedly reduced. In fact, my personal appraisal of the collected specimens certainly could not permit classification as "white water".

The following analytical determinations were also performed on specimens collected during my visit to Toledo:

Free CO_2	=	22.0 ppm
pH	=	7.3
Iron	=	0.24 ppm
Alkalinity P	=	None
T	=	318.0

Considerable concern was expressed by the local forces at Toledo regarding the large amount of mudlike precipitate noted in the reservoir when the well was pumped directly to this source through an open pipe. I obtained a sample of this riled up reser voir water and found it contained very heavy concentration of iron bacteria represented by both Galionella and Crenothrix. In my opinion, the free pipe pumping of this well into the open reservoir stirred up previously settled iron deposits on the bottom and sides of this reservoir. An iron content of 0.24 ppm as represented by the new well certainly could not cause this amount of percipitate under any conceivable conditions of oxygenation.

Some evidence of gas in the water still existed, and it is quite probably nitrogen as our tests for free CO_2 only revealed 22 ppm which is relatively low. However, the amount of gas collecting in a sampling device appeared to be insignificant, and should not cause previously formed iron corrosion deposits to sluff off of the distribution lines.

Case history of this situation indicates that large amounts of gaseous material were being pumped out of this well earlier, but all agreed that this condition no longer existed to an appreciable extent. I suggested that the well be cut into normal service again for a second trial period as there appeared to be no unusual physical or chemical characteristics of the water making its use illogical.

The earlier samples of collected gas from this well which were submitted to our laboratory showed definite presence of ordinary air but my dissolved oxygen tests "on the spot" definitely shows that this condition no longer exists. The portal of entry of this earlier aerated condition was not apparent to me at the time of my visit. I hope my report assists you in your evaluation of this situation.

R L Morris

R L Morris Ph D
Assistant Director &
Principal Chemist

mrw

GW file
Toledo Gen. Data
Tama Co.

October 16, 1962

Dr. R. L. Morris
State University of Iowa
Medical Laboratory Building
Iowa City, Iowa

Dear Dr. Morris:

Thank you very much for your letter of October 12 containing the results of your investigation and your thoughts concerning the well at Toledo. As a result, this problem is greatly clarified.

I appreciate very much your cooperation and efforts.

Sincerely yours,

H. G. Hershey

HGH/bjm

12687
083-15W 15CDD
TOLEDO CITY WELL #7

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Card Q

State: IOWA [19] (1-2) County: TAMA [86] (3-4) Town: TOLEDO

Well No. Latitude [415938N] (5-11) Longitude [0923500] (12-18) Seq. No. [1] (19) Date M D Y [080161] (20-25)

Sampling Depth [M] (26-29) Type [1] (30) Kx10^6 [1120] (31-35) pH [72] (36-38) Temp. °F [64] (39-41)

SiO_2 [80] (42-44) Ca [984] (45-49) Mg [471] (50-53) Na [704] (54-58) K [169] (59-61)

HCO_3 [378] (62-65) CO_3 [0] (66-67) SO_4 [255] (68-72) Cl [25] (73-78) Source No. [3] (79) [Q] (80)

Card R

Duplicate Columns 1-25 from Card Q

F [12] (26-28) NO_3 [04] (29-32) PO_4 [ ] (33-35) B [ ] (36-38) Al [ ] (39-41) Fe [024] (42-45)

Mn [005] (46-49) Cu [ ] (50-52) Pb [ ] (53-54) Zn [ ] (55-57)

Solids Determined [748] (58-63) Calc. [ ] (64-69) Hardness Ca,Mg [440] (70-73) Non-Carb. [440] (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 $CaCO_3$ [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. [ ] (80)

Recorded by: HEXUM

Punched by: MACGOWAN Date: 6/72

Published:

12687

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

083-15W 15CDD
TOLEDO CITY WELL #7

Water Quality
(ppm)

Card Q

State: IOWA [19] (1-2) County: TAMA [86] (3-4) Town: TOLEDO

Well No. Latitude [415938N] (5-11) Longitude [0923500] (12-18) Seq. No. [1] (19) Date M D Y [020372] (20-25)

Sampling Depth [M] (26-29) Type [1] (30) $Kx10^6$ [1000] (31-35) pH [6.9] (36-38) Temp. °F (39-41)

SiO_2 [7.8] (42-44) Ca [96.] (45-49) Mg [45.] (50-53) Na [79.] (54-58) K [1.9] (59-61)

HCO_3 [378] (62-65) CO_3 [0] (66-67) SO_4 [260.] (68-72) Cl [80.] (73-78) Source No. [3] (79) [Q] (80)

Card R

Duplicate Columns 1-25 from Card Q

F [1.1] (26-28) NO_3 [0.1] (29-32) PO_4 (33-35) B (36-38) Al (39-41) Fe [2.2] (42-45)

Mn [.002] (46-49) Cu (50-52) Pb [.01] (53-54) Zn [.01] (55-57)

Solids Determined [704] (58-63) Calc. (64-69) Hardness Ca,Mg [420] (70-73) Non-Carb. [420] (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 $CaCO_3$ [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: HEXUM

Punched by: MACGOWAN Date: 6/72

Published:

G-W file
Toledo Gen Data
Tama Co.

M E M O

October 10, 1962

To: Dr. H. G. Hershey
From: O. Van Eck
Re: Toledo Well # 7

On October 9, in company with Dr. R. L. Morris, I went to Toledo to investigate the claim that they are getting a lot of air in the water.

Water coming direct from the top of the pump column showed a very small amount of some type of gas was being produced with the water. This was shown by running the water through a tube into an inverted jug immersed in a bucket of water. I emphasize that the amount of gas is very small - no more than would be expected to be released from a water coming from a bottom-hole pressure of about 800 pounds per square inch to atmosphere.

Bob tested the water for dissolved Oxygen and obtained negative results. This, by the way, is a fairly simple test, that is, for the presence of Oxygen. Bob also took a sample to test for carbon dioxide. However, because our last water analysis of that water had a pH of 7.2, I doubt if the gas is CO_2.

The crux of their trouble seems to be that their pipe lines are bursting, and people are getting globs of rust in their water. The town of Toledo has had a severe iron problem of long standing, and I can imagine the conditions of the mains. Then, when they put this well on the system, the well was tied directly to the system without going into the resorvoir. As a result, I believe the mains are subjected to sudden increases in pressure. Then, because there is no foot-valve in the pump, when the pump stops, there is a sudden change in the direction of the surge.

With these thoughts in mind I believe the problem is the result of a hammering effect on the mains, which may in part be aggravated by a change in water chemistry, and in a very small part by the collection of gas in the mains.

It is my opinion that the well is not the part of the system at fault, and a redesigning of the system will ease their troubles. Or, perhaps time will cure the problem.

OVE/bjm