

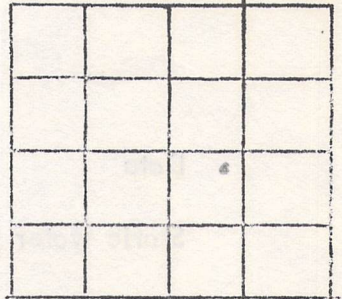
IOWA GEOLOGICAL SURVEY
In Cooperation with U.S. Geological Survey
RECORD OF WELL

1 7 2 3 6

Location:

Town: UNION (NE) County HARDIN
(SW)

NE NW SE Sec. 21, T. 86, N. (E), R. 19 (W) Twp.



Well name and number _____

Owner UNION TOWN WELL #2 (1965) Address UNION, IOWA

Tenant _____ Address _____

Contractor HORG & AMES, INC. Address LINCOLN, IOWA

Drillers Le Roy AMES

Drilling dates DEC. 17, 1964 - FEB. 19, 1965

Well data:

Altitudes: Drilling curb _____ feet; Land surface _____ feet

Determined by _____

Topographic position Top Hill

Total depth: Reported 615' feet; Measured _____ feet

Drilling method CABLE TOOLS

Hole and casing data _____

Original depth to water _____ above
fr. below _____ Date _____

Source of data _____

Sources of water: Principal CEDAR Valley
Others _____

PRODUCTION DATA

Date _____
Static water level 92.25
Pumping water level 131.35
Yield (g.p.m.) 238
Measuring point _____
Duration of pumping 6 1/2 HOURS
Specific capacity _____

LABORATORY DATA PL6-35-36

Well No. #17236 Sample range _____ No. of samples _____
No. of dupls. and cond. _____ Washed range _____
Samples prepared by Bud Date 3-19-65
Logged by NORTHUP Date FEB. 1965
Correlations by _____ Date _____



MEMBER

Phone 515 473-2707

HOEG & AMES, Inc. IOWA GEOLOGICAL SURVEY

WELL CONTRACTORS

WELL SUPPLIES

FEB 26 1965

LINCOLN, IOWA

30602



RECORD OF WELL # 2.

Owner - Town of Union, Iowa.

Location - On a hill near the water tower, in the town of Union, Iowa. N.W. corner of the S.E.¼ of Section 21, Union Township, Hardin County, Iowa.

Started the well - December 17, 1964.

Finished the well - February 19, 1965.

Size of well - 10" to 233 ft., 8" from 233' to 386',
7" from 386' to 535', 6½" from 535' to 615'.

Depth of the well - 615 ft.

Static water level - 92.25 ft.

Draw-down 39.10 ft., pumping 238 gallons per minute.

137 ft. of 10" pipe, 161 ft. of 8" pipe, 149 ft. of 7" O.D. pipe, and 1-10" steel Drive shoe installed.

Driller - LeRoy Ames, for Hoeg & Ames, Inc.

Remarks: 16" hole drilled to 20 ft., and 16" temporary casing placed. 12" hole drilled from 20' to 137' and 10" I.D. pipe placed from 0' to 137'. Cement Grout pressure placed between 10" pipe and 12" hole from 137' up to 20' and between 10" pipe and 16" pipe from 20' to the top, and 16" temporary liner pulled out. 10" hole drilled from 137' to 394', and 8" I.D. pipe placed from 233' to 394'. 8" hole drilled from 394' to 535' and 7" O.D. pipe placed from 386' to 535'. 6½" diameter hole drilled from 535' to 615'. Test pump was installed and pumping test was conducted for 6½ hours. Well was chlorinated and capped.



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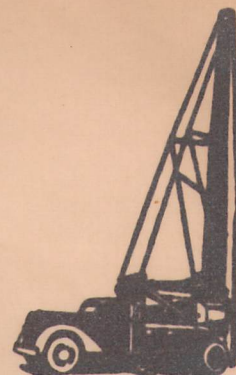
HOEG & AMES, Inc.

WELL CONTRACTORS

WELL SUPPLIES

LINCOLN, IOWA

30682



GEOLOGICAL FORMATIONS - WELL # 2

UNION, IOWA.

0'	to	5'	-	Black Dirt.
5'	to	50'	-	Yellow Clay.
50'	to	55'	-	Sand and Gravel.
55'	to	124'	-	Blue to Gray Clay.
124'	to	137'	-	Brown Rock.
137'	to	230'	-	Brown Rock.
230'	to	280'	-	Gray and Yellow Shale.
280'	to	290'	-	Gray Rock.
290'	to	315'	-	Gray Rock.
315'	to	390'	-	Shale.
390'	to	430'	-	Gray to Yellow Rock.
430'	to	530'	-	Gray Shale.
530'	to	535'	-	Light Brown Rock.
535'	to	555'	-	Light Brown Rock.
555'	to	560'	-	Light Gray Rock.
560'	to	565'	-	Dark Brown Rock.
565'	to	615'	-	Light Brown Rock.

Total Depth - 615 feet.



MEMBER

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HOEG & AMES, Inc.

WELL CONTRACTORS

WELL SUPPLIES

IOWA GEOLOGICAL SURVEY

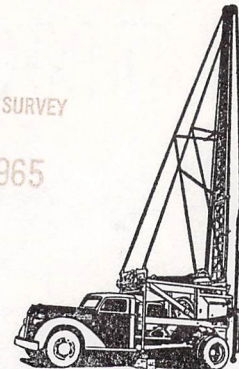
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LINCOLN, IOWA

50652

February 20, 1965.

FEB 23 1965



Iowa Geological Survey,
Geological Survey Building,
Iowa City, Iowa.

Attn: Dr. H. G. Hershey.

Dear Dr. Hershey;

Enclosed is a copy of the pumping record of the Well # 2, at Union, Iowa. We will send a copy of the well record later. Also, we will be delivering the formation samples in the near future.

We are sending a water sample from the well, for complete analysis. Will you please send us one copy of the report, and send another copy to the Town of Union, c/o Burl Crawford?

Yours respectfully,

Hoeg & Ames, Inc.

H. J. Rhodes

H. J. Rhodes,

Vice-president.

HJR/nvh.

Encl:

*Water sample
taken to
Lab
2/23/65*

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa
WELL OR WATER SAMPLE DATA

Bottle No. 3

I.G.S. Well No. W-17236

TOWN Union, Iowa. COUNTY Hardin

LOCATION Town sec. 21 T. 86 N., R. 19 ^{W.} Union Twp.

OWNER OF WELL Town of Union, Iowa. WELL NO. 2

USE OF WATER: Municipal supply(x); Private-domestic(); Public drinking(x); Live-stock(); Industrial(); School supply(x); Air conditioning(); Cooling(); ().

CONSTRUCTION OF WELL: Drilled: Cable tool(x), Rotary(); Gravel-pack type(); Driven(); Dug(); Bored(); Jetted(); ().

CONTRACTOR Hoeg & Ames, Inc. DATE STARTED 12-17-1964
DATE FINISHED 2-19-1965

CASING OR CURBING DATA: (Show by diagram on opposite side of sheet the kind, length and depth of top and bottom of each size of pipe, the amount of overlaps, position of seals or packers, pipe perforation and screens, etc.)

WELL DATA Present Final
Curb Elevation _____ Ft. Depth 615 Ft. Depth 615 Ft.
Ground Elevation _____ Ft. Topographic Position on top of a hill
Static Level (Depth to water (above) curb) 92.25 Ft. Level 131.35 Ft. Pumping
(below) 39.10
Amount of Drawdown ~~##~~ Ft. pumping at 238 g.p.m. in 6 hrs. 30 minutes.
Specific Capacity _____ g.p.m. per ft. drawdown in _____ hours.
Type of Pump _____ Power electricity
Depth of Bottom of Pump _____ ft. with _____ ft. of suction pipe.

TEMPERATURE: Air _____ °F.; Water _____ °F., measured after well had pumped _____ hours and _____ mins. at _____ g.p.m.; _____ ft. from pump after water had passed through the following pipe _____ Time _____ (A.M.) (P.M.)

SOURCE OF WATER:
Principal producing formation Limestone - Dolomite _____ ft. to _____ ft.
Other producing formations _____ ft. to _____ ft.

REMARKS: (Taste, odor, and appearance) slight sulphur odor

Sample taken for: Mineral analysis (x); Sanitary analysis ().
Date collected by Hoeg & Ames, Inc. Date 2-19-1965

Copies to: Town of Union, Iowa, c/o Burl Crawford.
Hoeg & Ames, Inc., Lincoln, Iowa.

WELL PRODUCTION TEST DATA SHEET

Job CITY OF UNION WELL # 2 Date Tested FEB 19-1965
 Location HILL NEAR WATER TOWER Tested by LE ROY AMES
 Diameter of Well 10"-8"-7" Pump Used TURBINE
 Depth of Well 615 FEET Driver GASOLINE ENGINE
 Length of Airline ELECTRIC LINE Col. & Shaft 3 1/2"
 Static W. L. 92.25 Bowls 7"
 Orifice Size STOCK TANK MEASURED Mfr. FAIRBANKS MARSE

TIME	ORIFICE READING	GPM	PUMPING LEVEL	STATIC W. L.	DRAW-DOWN	REMARKS
10:00 A.M.		224	126.95	92.25	34.70	STARTED PUMP
10:25		224	128.30		36.05	WATER DIRTY
11:00		224	129.70		37.45	" "
11:30		224	129.15		36.90	WATER CLEARING
12:00		266	130.0		37.75	WATER CLEAR
1:00 P.M.		238	130.95		38.70	
1:30		238	130.95		38.70	
2:00		238	131.35		39.10	
2:30		126	109.60		19.25	SLOWER RATE
3:00		133	109.20		16.95	
3:30		133	109.10		16.85	
4:00		133	108.80		16.55	
4:30		126	108.10		15.85	COLLECTED WATER SAMPLE

GW Union Town well Alder (1965)
Hardin County

February 1, 1965

Mr. Homer Rhodes
Hoeg and Ames, Inc.
Lincoln, Iowa

Dear Mr. Rhodes:

We would like to advise that we have now studied the samples of the Union Town Well, to a depth of 500 feet, which LeRoy brought in last Thursday. Our log shows the following section:

Pleistocene	0 - 125'
Mississippian System	
Gilmore City Formation	125'
Hampton Formation	150'
North Hill Formation	225'
Prospect Hill Formation	230'
Maple Mill Formation	235'
Aplington Formation	280'
Sheffield Formation	305'
Devonian System	
Lime Creek (Owen Member)	385'
Lime Creek (Cerro Gordo Member)	430'
Lime Creek (Juniper Hill Member)	475'

At 500 feet you are still in the Juniper Hill shale, and we now anticipate the Cedar Valley from 525 to 535 feet. This is a little deeper than LeRoy was advised last Thursday, but it is somewhat easier to estimate now that we have had a chance to study the samples in greater detail.

We hope that the Cedar Valley will yield sufficient water for the town of Union. By all rights it should, as has been the case with such nearby towns as Grundy Center, Colo, and McCallsburg. We mentioned to LeRoy that it would be best to complete the well in the upper part of the Cedar Valley, as the lower part may well contain gypsum. However, there should be no trouble for at least a hundred and fifty feet or so.

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

Yours very truly,

R.C.N.
HGH/I

H. G. Hershey

MEMORANDUM

November 6, 1964

To: Dr. H. G. Hershey
From: Fred H. Dorheim
Re: Water supply, town of Union

On Tuesday, November 3rd, I met with Mr. John Hensley, Mr. Burl Crawford, and Dr. Robert Carithers of the Union Town Council, to discuss with them the location of a new well for the town of Union.

Union is situated on a large terrace adjacent to a wide Iowa River floodplain. Quite a large area of the terrace is mapped as O'Neill loam which has coarse sand and gravel as parent material. The area of O'Neill loam is quite narrow through town but widens appreciable south of town. The town plans for a sediment basin at the lower (downstream) end of this terrace.

The Council was considering a choice, as they saw it, between a well on the terrace near the east end of town or an upland well near the west end of town. They expected either well to go into terrace gravels. I explained to them that the terrace gravels would not extend under the upland; that the probability of extensive gravels, that might supply adequate water, existing under the upland was very improbable. I then explained that if they wanted an upland well they should plan to go into bedrock to approximately the same position as was reached in the town well they were using. I also explained that any plans for a supply of water from the terrace gravels should include a program of test drilling to locate the area of greater yield.

They asked if a limestone well would give the same quantity and quality of water as they were getting in the present city well. I told them that the quantity was dependent upon the fractures in the limestone; that a well drilled into the same formation could produce the same, produce more, or produce less; that if the yield was low acid treatment could help. I said we would expect the quality to be quite constant.

I think they plan to propose a limestone well similar to their present well. I do not think further action on our part is necessary at this time.

FHD/m

SEARCHED INDEXED
SERIALIZED FILED
NOV 10 1964
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GEOLOGICAL SURVEY
MOBILE OFFICE

GROUND-WATER CONDITIONS
AT UNION, IOWA

The following statements represent an interpretation of the available information in the files of the Iowa and U. S. Geological Surveys.

The town of Union (1960 population 534) is located on Highway 215 in southeastern Hardin County, Iowa in parts of sec.'s 21 and 22, T. 86N., R. 19W. This places it on a terrace at the edge of the Iowa River valley. The surrounding area consists of moderately hilly Kansan glacial drift. The town is about 15 feet above the flood plain of the river and about 120 feet below the upland. A generalized log of the formations encountered in the existing town well drilled in 1946 is summarized below (all depths are referred to a starting surface elevation of 937 feet above sea level):

<u>Formation</u>	<u>Thickness (ft.)</u>	<u>Depth Range (ft.)</u>
<u>Quaternary System</u>		
Pleistocene Series (glacial drift, very sandy, some coarse sand and gravel)	50	0-50
<u>Mississippian System</u>		
Gilmore City Formation (limestone, oolitic)	40	50-90
Hampton Formation (mostly dolomite, calcareous, some chert in lower part)	85	90-175
Chapin Limestone, oolitic	5	175-180
Prospect Hill Siltstone	10	180-190

No drilling sample was received from the final 5 feet, but the well probably was finished in siltstone or shale belonging to the Prospect Hill or Maple Mill Formations.

According to the driller this well was cased with 83 feet 5 inches of 10-inch casing and 20 feet 6 inches of 8-inch casing set at 102 feet. The static water level was reported to be 23 feet below the surface. A pumping test produced 300 gallons a minute while lowering the water level only 5 feet. The most recent chemical analysis indicates the water to be of good quality and low mineralization.

Formerly the town obtained its supply from wells drilled into a sand and gravel bed beneath the terrace. These wells were put down many years ago and were reported to be very satisfactory. A mineral analysis obtained in 1934 showed the water to be of good quality and only moderately hard. At the time the shallow system was abandoned in 1946, the wells were reported to yield 90 gpm.

Some water-bearing sands that will comprise another source of supply probably will be found beneath the floodplain of the Iowa River. The nearness of the river with its recharge potential is a favorable factor. A gravel pack installation or collecting gallery might yield reasonably large water supplies. However, the alluvial and glacial deposits are thought to be only about 35 feet thick beneath the valley floor here. Some test drilling will be necessary to locate the most suitable sand formation.

From the foregoing it would seem that there are ^{Two} three potential ground-water reservoirs at Union capable of yielding sufficient water for the town. The Mississippian bedrock aquifer may be the most dependable source based on the large output of the present town well. However, the yield of limestone and dolomite strata may vary considerably from place to place since the production is dependent on the drill intersecting large crevices or solution openings along which water can move into the well bore. Where these openings are absent or small the yield of wells may be disappointingly low. Acidizing the water zones may appreciably increase the original yield. A new bedrock well should be located a considerable distance from the existing town well or any other well pumping from this source to minimize the interference effects.

The shallow sands beneath the terrace and floodplain of the Iowa River may also yield reasonably large water supplies to wells. However, unless the sands are connected to the river recharge the production may not be very dependable. Moreover, the water in the shallow sands may be contaminated by infiltrating surface drainage. Wells on the river bottoms will also be in position to be damaged by floods.

In summary, it would seem advisable to drill a new well similar to the existing town well down to the top of the Prospect Hill Siltstone with casing set at approximately 102 feet in the top of the Hampton Formation. This well should be located as far as possible from the existing well and preferably on the other side of town. If the initial yield is less than desired, the well may be acidized to increase the production. A second choice would be to drill several test wells in an attempt to obtain a supply from shallow sand and gravel beneath the terrace level or river bottomland.