RESULTS OF PRODUCTION TEST MADE ON TOWN WELL (1948)

AT

STEAMBOAT ROCK

October 9, 1948

NAME: Steamboat Rock Town Well (1948).

LOCATION: NW¼ NW¼ NW¼ Sec. 27, T. 88 N., R. 19 W. Clay Twp. Hardin Co.

ELEVATION: Drilling curb 1075 feet above sea level.

OWNER: Town of Steamboat Rock.

CONTRACTOR: Hoeg and Ames, Lincoln, Iowa.

DRILLER: Ervol Fink.

DRILLING DATES: Started, September 7, 1948. Finished October 5, 1948.

TOTAL DEPTH: 750+ feet.

CASING DATA: About 132 feet of 10-inch casing from +2 to 130 feet. 266 feet of 8-inch casing from 87 to 353 feet. 158 feet of 6-inch casing from 327 to 485 feet. Open 6-inch hole from 485 to 750+ feet.

CHIEF AQUIFER: Reported between 705 and 750+ feet.

TEST PUMP: Turbine, setting 226 feet. Powered by gasoline engine.

WATER LEVEL MEASUREMENTS: Depth to water measurements were referred to hole in pump base 2.0 feet above land surface.

TEM PERATURE MEASUREMENTS: Temperature of the pumped water was measured at the end of 10 feet of 4-inch discharge pipe.

DISCHARGE MEASUREMENTS: Discharge rate obtained by measuring into barrel of known capacity.

NOTE: Well was pumped for about 2 hours on October 8.

Observations by W. E. Hale.

RESULTS OF PRODUCTION TEST MADE ON STEAMBOAT ROCK TOWN WELL (1948)

TIME	DEPTH TO WATER	DISCHARGE RATE G.P.M.	TEMP. °F.	REMARKS
Oct. 9				
8:55 AM	176.35			
8:57	176.32			
9:00				Pumping started.
9:01	208			
9:02	213			
9:03	215			
9:07	226-	112±		Water cloudy, yellow.
9:10			52	Water dirty yellow-brown.
9:15		106±		Water clearing.
9:20	226	112±		Breaking suction.
9:45	226	106±		Water clearing.
10:06		100±	52½	Water almost clear.
10:30		103±		Water clear, trace fine cuttings.
10:50	226	103±	52½	
11:08				Pumping stopped, pulley loose.
11:16				Pumping resumed.
11:25	226-	110		
11:35	226	110+		Water slightly cloudy.
11:40		103+		Water almost clear.
12:45 PM	226	108±		
12:57				Reduce pumping rate.
1:00	203.6	80±		
1:05	204	81±		Water clear, trace for cuttings.
1:20	204.6	81		
1:45	204.85	80		Water clear. Water sample collected.
2:00	204.85	80		Pumping stopped.
2:01	176±			Recovery measurements.
2:02	177.9			
2:03	177.9			
2:05	177.9			
2:10	177.85			
2:20	177.78			
2:25	177.78			
2:30	177.77			

Hardin

88-19-27D

October 18, 1948

Town Clerk
Steamboat Rock,
Iowa

Dear Sir:

Enclosed is a copy of the results of the production test made on the new 750-foot town well at the water tower. You will note that for the short time that the well was pumped at about the rate of 80 gallons per minute, the pumping level was about 205 feet below the pump base or 203 feet below land surface. Continued pumping at the rate of 80 gallons per minute would probably lower the pumping level between 10 and 15 feet more at the end of one to five years.

A pump setting of 220 feet would appear to be satisfactory if the well is to be pumped between the rate of 75 and 80 gallons per minute.

Preliminary determination of the hardness of the water from this well using a soap solution indicates a hardness of over 1400 parts per million. While this method of determination is not accurate, the results show the water to be very hard. The complete analysis will be sent to you just as soon as the work is completed.

Very truly yours,

William E. Hale

WEH:AEH
CC: Mr. K. S. Krause, District Health Engineer
Mr. S. R. Ames, Hoeg & Ames

Hardin Co.

July 21, 1948

Mr. K. S. Krause
113 President Court
Mason City, Iowa

Dear Mr. Krause:

Regarding your letter concerning the possibilities of a new well at Steamboat Rock, Hardin County, we have received a request for a forecast from the drilling contractor on the new well.

As you know, the shallow wells at Steamboat Rock did not furnish very large quantities of water. The well 150 feet deep reportedly furnishes only about 10 gallons per minute.

In order to develop a larger supply, it would therefore probably be necessary to drill through the Maple Mill shales and penetrate one or more of the deeper aquifers. Some water should be encountered in the limestone and dolomite of the Cedar Valley and Wapsipinicon formations; however there may be some gypsum in these formations at Steamboat Rock which would have to be cased off as it would produce a hard water high in sulphate content. This type of water is obtained at Wellsburg from their deep city well. Additional water should be found in the Galena formation which lies below the Maquoketa shale, and in the St. Peter sandstone.

Based on a starting elevation of 1070 feet, or about 50 feet higher than the present 150-foot city well, the following formations should be encountered at the depths given. Some revision of depths may be necessary, once drilling has commenced and the samples are available for examination.

Formation and Character	Depth in Feet From	To
Pleistocene and Pennsylvanian systems (undifferentiated) (clay, shale, possibly some sandstone)	0	100
Mississippian system		
Hampton formation (dolomite, cherty in places)	100	195
Maple Mill formation (shale)	195	295
Devonian system		
Lime Creek formation (chiefly limestone and dolomite in upper 80 feet, underlain by shale)	295	440
Cedar Valley-Wapsipinicon formations (limestone and dolomite, possibly some gypsum around 625 and 750 feet)	440	755

Formation and Character	Depth in Feet From	To
Silurian system (cherty dolomite)	755	795
Ordovician system		
Maquoketa formation (shale, some cherty dolomite)	795	1030
Galena-Decorah-Platteville formations (limestone, cherty in part, shales near base)	1030	1365
St. Peter formation (sandstone)	1365	1405

Very truly yours,

H. G. Hershey

HGH:KEA:AEH

APR 30 '51

DISTRIBUTORS OF
POMONA
AND
FAIRBANKS-MORSE
DEEP WELL PUMPS

WE SERVICE
AND
REPAIR
ALL MAKES OF
DEEP WELL PUMPS

THORPE WELL COMPANY

CONTRACTORS

LATEST ROTARY AND CABLE TOOL EQUIPMENT
THORPE PATENT GRAVEL PACKED WELLS

2340 SIXTH AVENUE
TELEPHONE 3-6107

PLEASE ADDRESS ALL REPLIES
DIRECT TO THE COMPANY
LOCK BOX 1376

DES MOINES, IOWA

April 28, 1951

Iowa State Geological Survey
Geology Annex
Iowa City, Iowa

Attention: Dr. H. G. Hershey

Gentlemen:

We have received an inquiry from the Town of Steamboat Rock relative to getting more "good" water for their town. In 1939 we put in a well approximately 150 feet deep. Since that time there have been two other wells drilled--one right close to our well, and another one approximately 700 feet deep up by the water tower.

I would very much appreciate your thoughts and findings on what would be necessary to get a satisfactory water supply for this town. As I understand it, the water from this deep well is about 80 grains hard and shows a trace of contamination at times. Among other things, the town is not very well blessed with money either.

Your assistance in helping us check this matter would be very helpful. Thanking you in advance, we remain

Sincerely yours,

THORPE WELL COMPANY

Phil Thorpe

Philip T. Thorpe

PTT:rs

Hardin

May 4, 1951

Mr. Philip T. Thorpe
Thorpe Well Company
2340 Sixth Avenue
Des Moines, Iowa

Dear Mr. Thorpe:

In reply to your letter of April 28 relative to information on the development of a satisfactory water supply for the town of Steamboat Rock, Iowa, we have prepared the following report summarizing our findings on the geology and general ground-water conditions in that vicinity. All data were taken from the available material in the open files of the Geological Survey.

The town of Steamboat Rock is situated on a terrace along the Iowa River in eastern Hardin County, mostly in the N½ sec. 28, T. 88 N., R. 19 W. The topography of the surrounding region is a gently to strongly rolling Kansan drift surface. West of the Iowa River there is a wide chain of hills and ridges forming a moraine at the eastern boundary of the Wisconsin drift. We find the elevation of the land surface at well No. 1 in the south-central part of town to be 1,020 feet. The deep well located in the northeast part of town has a somewhat higher elevation, 1,070+ feet. The log of the deep town well drilled into the Wapsipinicon formation follows:

Formation and description	Thickness (ft.)	Depth (ft.) From	Depth (ft.) To
Pleistocene system			
Glacial drift (yellow-brown and gray pebbly till)	100	0	100
Mississippian system			
Hampton formation			
Maynes Creek member (dolomite, cherty)	95	100	195
Prospect Hill formation (siltstone)	15	195	210
Maple Mill shale	20	210	230
Aplington dolomite	40	230	270

Devonian system			
Sheffield shale	80	270	350
Lime Creek formation			
Limestone	50	350	400
Shale with a little limestone	85	400	485
Cedar Valley formation			
Limestone	115	485	600
Dolomite containing gypsum in middle part and chert at base	130	600	730
Wapsipinicon formation (dolomite)	20	730	750 T.D.
Additional anticipated strata below 750 feet:			
Devonian system (continued)			
Wapsipinicon formation (continued) (dolomite)	40	750	790
Ordovician system			
Maquoketa formation (shale and limestone in upper part; limestone and some chert in lower part)	285	790	1075
Galena formation (limestone, cherty in part)	255	1075	1330
Decorah-Platteville formations (limestone and shale)	80	1330	1410
Glenwood shale	10	1410	1420
St. Peter sandstone	30	1420	1450
Prairie du Chien formation (sandy dolomite with a comparatively thin bed of sandstone in the middle)	550	1450	2000
Cambrian system			
Jordan sandstone	55	2000	2055
St. Lawrence dolomite		2055	

Adjustments will be necessary on the depth figures if a well is begun at a different starting altitude than 1,070 feet.

The thickness of the glacial material is at least 100 feet beneath the upland site of the deep town well. At this locality the drift consists chiefly of yellow and gray pebbly clay. Closer to the Iowa River, in well No. 1, the Pleistocene material is reported to consist of 46 feet of sand below a thin layer of topsoil. Presumably no attempt has been made to develop a water supply in the valley deposits although there might be a fair chance for this. The river valley is rather narrow at Steamboat Rock, but a few well-placed test holes across the lowlands should indicate the possibilities from this source. We understand that bacterial contamination of the wells near the river has given the town considerable trouble. If shallow wells are drilled, they might be located upstream from town to try to get away from this difficulty.

The bedrock in the Steamboat Rock town wells is the Maynes Creek cherty dolomite comprising the lower part of the Hampton formation of Mississippian age. As you know, the No. 1 town well produced 17 gallons a minute from the Maynes Creek. Much larger yields are obtained from Mississippian strata in other parts of Hardin County. For example, the Eldora Co-op Creamery well, which was completed in the top of the Sheffield shale at 345 feet, obtained 250 gallons a minute from the Hampton and Aplington dolomites with 5 to 6 feet of drawdown. The static water level was given at 133½ feet. In the southeast part of the county, the Union town well reportedly developed 300 gallons a minute with 5 feet of drawdown from the lower Hampton formation. The static water level was 23 feet below the surface. Perhaps the yield from the Mississippian formations at Steamboat Rock can be increased by drilling through the Aplington dolomite to the top of the underlying shale and casing off the weak Prospect Hill-Maple Mill section as in the Co-op Creamery well at Eldora. Acidizing might help to open some aquifers, although the porosity of the rocks may be too low for the aquifer to respond to acid treatment. Chemical analyses show the Mississippian waters have a hardness range of between 240 and 485 parts per million and generally to be of better quality than deeper sources.

In addition to the deep well at Steamboat Rock there are several wells in this vicinity which obtain part or all of their water from the Devonian system of rocks below the Mississippian. Limestone beds belonging to the Lime Creek and upper part of the Cedar Valley formations are the usual source of water in the Devonian, but at Steamboat Rock and Wellsburg the dolomites in the lower part of the Devonian are utilized. The Lime Creek and Cedar Valley formations yield large supplies in some places. The Fern Creamery well in north-central Grundy County pumped 175 gallons a minute for 5 hours 20 minutes with 14 feet of drawdown. The static water level was 172 feet. This well penetrated 115 feet into the Cedar Valley limestone. Water from this section apparently is of very good quality. Analysis of the Fern Creamery water is attached.

Water from the lower part of the Devonian system of rocks at Steamboat Rock is highly mineralized in calcium and sulfate. The change from good water to increasingly mineralized water in the Devonian should begin at about 600 feet where the first trace of gypsum appears. Below this depth to the top of the Maquoketa shale all water probably will be of poor quality.

Additional water supplies may occur in the underlying limestones belonging to the Maquoketa, Galena, and Decorah-Platteville formations, and in the St. Peter sandstone at a depth of between 850 and 1,450 feet. During the drilling of the Ralston-Purina Company well No. 3 at Iowa Falls, the section from the Cedar Valley formation down to a depth just above the St. Peter sandstone produced 60 gallons a minute on a bailer test of 7 3/4 hours. The drawdown was reported to be 50 feet from a static water level of 65 feet. Analysis of the water shows it to be of fair quality having a hardness of 603 parts per million, which is only about one-half as hard as the present deep well water at Steamboat Rock. However, no gypsum was encountered in the Devonian rocks at Iowa Falls such as occurs at Steamboat Rock.

There is another possibility of obtaining a successful well for the town by drilling to the Jordan sandstone. The top of this formation is estimated to lie about 2,000 feet below the surface. The formation is thought to yield large supplies of water in this part of Iowa. A pumping test conducted for 41 3/4 hours developed 630 gallons a minute in the Ralston-Purina Company well at Iowa Falls, which is completed in the top of the St. Lawrence dolomite. The static water level was listed at 107 feet and the pumping level at 198 1/2 feet. The hardness of this well water is exceptionally high for Jordan waters, however, suggesting that other aquifers are contributing to the well.

In summary, several possibilities for a suitable water supply at Steamboat Rock are indicated by this report - the valley alluvial sands, the Mississippian dolomites and upper Devonian limestones, the Galena limestone and St. Peter sandstone, and the Jordan sandstone at great depth. The most promising sources for good water probably are the Mississippian and Devonian strata to about 600 feet and possibly the Jordan sandstone.

Attached are a few representative water analyses of the different aquifers in this general area.

We shall be interested to hear of any developments on this project. If you have any questions on this report or if we can be of further service in any way, please contact us.

Very truly yours,

H. G. Hershey

Enclosure

HGH:PJH:emh

IOWA GEOLOGICAL SURVEY
TABULATION OF WATER ANALYSES
(Dissolved constituents in parts per million)

COUNTY _____

TOWN - Well No. Use - Location	Date of coll.	Depth (ft.)	Geol. source	°F.	Diss. solids	Fe	Mn	Ca	Mg	Na+K(as Na)	HCO_3	SO_4	Cl	F	NO_3	Hardness (calc. as $CaCO_3$) Tot.	Carb.	Non-carb.	pH	Cond.
Steamboat Rock Town well	7/19/40	150	Miss.		250	0.5	0.2	79	31	13	400	22	8.0	Tr.	11	325	325	0	7.3	
Eldora city well	12/23/36	315	Miss. Hampton	49	287	1.0	0.5	74	24	0.3	347	2.9	3.0	Tr.	0.9	284	284	0	7.2	
Fern Creamery	10/24/49	420	Dev. C.V.		324	0.15	0.0	63	26	26	305	45	1.0	1.0	0	264	250	14	7.6	
Wellsburg town well	9/11/40	765	C.V. Wapsi.		2241	0.9	0	422	138	5.9	286	1288	9.0	2.1	0	1622	234	1388	7.1	
Steamboat Rock Town well (1948)	10/9/48	750	Dev.	53	2003	0.6		342	107	62	293	1148	9.0	0.2	0	1295	240	1055	7.6	
Ralston-Purina Co., Inc. Iowa Falls	8/31/42	1315	Dev. Ord.		974	Tr.	Tr.	151	55	66	298	462	8.0	2.0	Tr.	649	244	405	7.7	
do	8/8/43	1879	Jordan(?)	53	1096	1.6	0	192	70	119	371	481	144	2.0	0	768	304	464	7.2	

NOTES:

W-3420

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

RECORD OF WELL

Location:

Town: Steamboat Rock (N E / S W): County Hardin

NW¼ NW¼ NW¼ sec. 27 T 88 N., R. 19 W. Clay Twp.

Well name and number Steamboat Rock Town well (1948)

Owner Town of Steamboat Rock Address

Tenant Address

Contractor Hoeg & Ames Address Lincoln

Drillers Ervol Fink

Drilling dates Started Sept. 7, 1948 Finished Oct. 5, 1948

Well data:
Elevations: Drilling curb 1070 ± feet; land surface 1070 ± feet (1077' - JBC, CWL, WEH 6-26-48)

Determined by

Topographic position Hilltop

Total depth: Reported 750+ feet, Measured feet

Drilling method Cable tool

Hole and casing date 132 feet of 10-inch pipe from +2' to 130'; 266 feet of 8-inch pipe from 87 to 353 feet; 158 feet of 6-inch casing from 327 feet to 485 feet. Open 6-inch hole from 485 to 750 feet.

Original depth to water 174.35 ft. ~~above~~ below Land surface Date Oct. 9, 1948

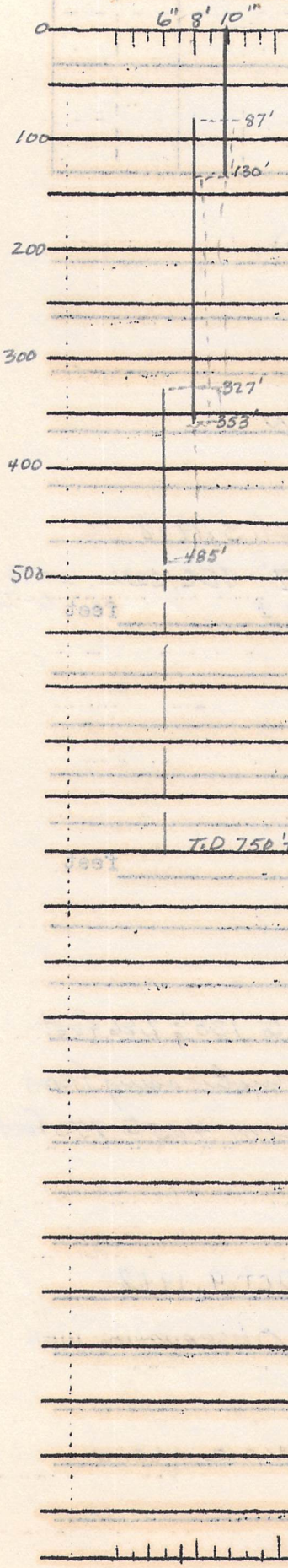
Original elevation of water level ft.; Source of data Observation WEH

Sources of water: Principal Rupt 705 to 750 ; Others None open

CASING DIAGRAM

LOG

Vertical scale 1 div = 50'



0-28 yellow clay

28-100 Blu clay

100-203 ls, brn

203-230 shale

230-260 ls; gray

260-345 - sh light

345-355 ls, brn

355-358 shale

358-380 ls, gray

380-485 shale blu

485-590 ls good

590-600 ls, gray + sh bands

600-643 ls, brn

643-665 ls brn & ppp.

665-700 ls, brn

700-750 ls, brn (water 705-750)

Production data: Date Oct. 9, 1948

Static depth to water 176.35 Measuring point Top casing 2.0' above L.S.
Pumping level 204.6 at 8/± g.p.m.

226 110±

Specific capacity about 2 g.p.m. per ft. drawdown; Temperature 52 °F.

Pump data; Type pump Column Dia. Length
Cylinder or bowls: Dia. Length Suction pipe
Power Airline

Estimated rate of production: 75 g.p.m. for - hrs. a day

Use of water Town supply

WATER ALALYSES (in parts per million)

Date samples	10/9/48			
Sampled by	W.E. Hale			
Total solids	200.3			
Insoluble matter	14.			
Alkalinity (Meo)	240			
Alkalinity (Phn)	None			
pH	10/9/48 7.6			
Fe_2O_3- Mn_2O_3-Al_2O_3	9.5			
Alkali as sodium	64.9			
Calcium	342.2			
Magnesium	107.2			
Iron (unfiltered)	0.6			
Manganese				
Nitrate	None			
Fluoride	0.2			
Chlordie	9.0			
Sulfate	1148.3			
Bicarbonate	292.8			
Hardness (ppm)	1297.			
Hardness (gpg)	75.8			

Remarks

Laboratory data: Sample storage location CEI-9,10

Sample range 0-750 No. spls. 148 No. dupls. & cond. 148 - Good
Spls. prepared by EMR + J.C.C. Washed range 203-750 by EMR
Driller's log and cond.

Insoluble residues: Prepared by Studied by Strip log
Microscopic study MCP strip log MCP
Gen. log Correl. by MCP

3420

Name: Steamboat Rock town well (1948)

Loc: NW NW NW 27-88N-19W, Hardin Co.

Drilling depth: 270' base Aplington

Drilled: Hoeg & Ames Sept.-Oct. 1948

Log: W-3420

Remarks: Well was completed in Wapsipinicon fm. at 750'.
We have analysis of Steamboat Rock town No. 1 (1951), but no samples.

Elevation 1070'

Formations	Depth	Top	Base	Thick.
Maynes Crk.	100'	970	875	95
Pros. Hill	195	875	860	15
Maple Mill	210	860	840	20
Aplington	230	840	800	40
Dev.				
Sheffield	270	800		