IOWA STATE DEPARTMENT OF HEALTH
DIVISION OF PUBLIC HEALTH ENGINEERING AND INDUSTRIAL HYGIENE

GROUND WATER

Town Atkins County Benton Date 3-2-42 19

WELL NO. 1 Active yes Standby Abandoned Replaced by No.

LOCATION: Street 1st street Sec. 14 T. 83 N.R. 9 East: West

Lot 18 Block 5 Township Fremont

OWNERSHIP Municipal Date Installed Feb. 19 39

CONTRACTOR C. Nolan Address Cedar Rapids

DATE RECONDITIONED 19 Contractor Address

CONSTRUCTION EMPLOYED:

CURB ELEVATION REFERENCE

TYPE OF CONSTRUCTION drilled Depth 456 ft. Diameter 10 in.

CASING: Material wrought iron driller steel Condition good

SCREEN: Material Length ft. Diameter in. Slot Opening in.

WELL SEALED yes How concrete Approved yes

WELL VENTED yes How 1" vent Approved no

TYPE OF PUMP Turbine Make F-M Capacity 50 GPM Lubricated oil & water

DEPTH TO CYLINDER 120 ft. Tail Pipe none ft.

PUMP CONTROL: Manual X Automatic Semi-Automatic

STATIC LEVEL 85 ft. Pumping Level 95 ft. Drawdown 10 ft.

OPTIMUM SPECIFIC YIELD 100 GPM Drawdown 12 ft. Time 6 hrs.

RATE OF DRAWDOWN slow Rate of Recovery rapid

TEMPERATURE OF WATER 51 °F Where Measured tap Temp. of Atmosphere 38 °F

DRAWDOWN GAUGE INSTALLED No

TOPOGRAPHICAL POSITION OF WELL Valley

WELL SITE INVESTIGATED yes Approved yes Why not

WELL CONSTRUCTION REVIEWED yes Approved Why not

PIT CONSTRUCTION: Purpose Size and Description

CONDITION: Drainage Facilities

PUMP INSTALLATION: Approved yes Why Not

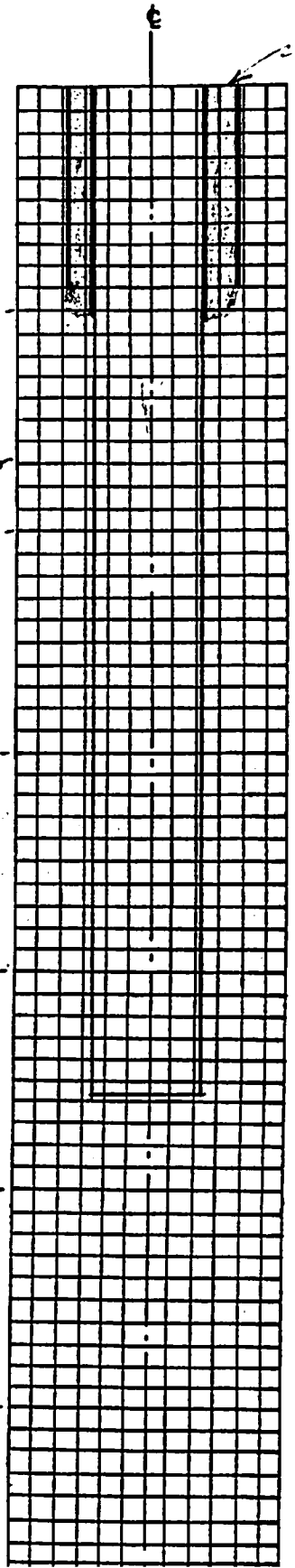
CUTTINGS FROM WELL PRESERVED: yes Where Iowa City

DEPTH TO BED ROCK 100' Depth to Water-bearing Stratum 300'

SOURCE OF WATER: Principal Formation Other

GEOLOGICAL DATA			CASING DATA	WELL DATA	
Formation	Material and distance from surface in ft.	Series	Position, kind and extent of casing, liners, shoes, etc.	Scale: Horizontal 1" = 2" Vertical 1" = 10'	Position of seals, screens, static level, etc.
	0				
	Clay 20				
	Sand 28				
	Sand & Blue Clay 40				
	Blue Clay 63				
	Sand & Blue Clay 73				
	Sand 78				
	Blue Clay 89				
	86				
	Lime Stone				
	180				
	Lime Stone & Shale 210				
	Lime Stone 250				
	Lime Stone & shale 280				
	Lime Stone				
	456				

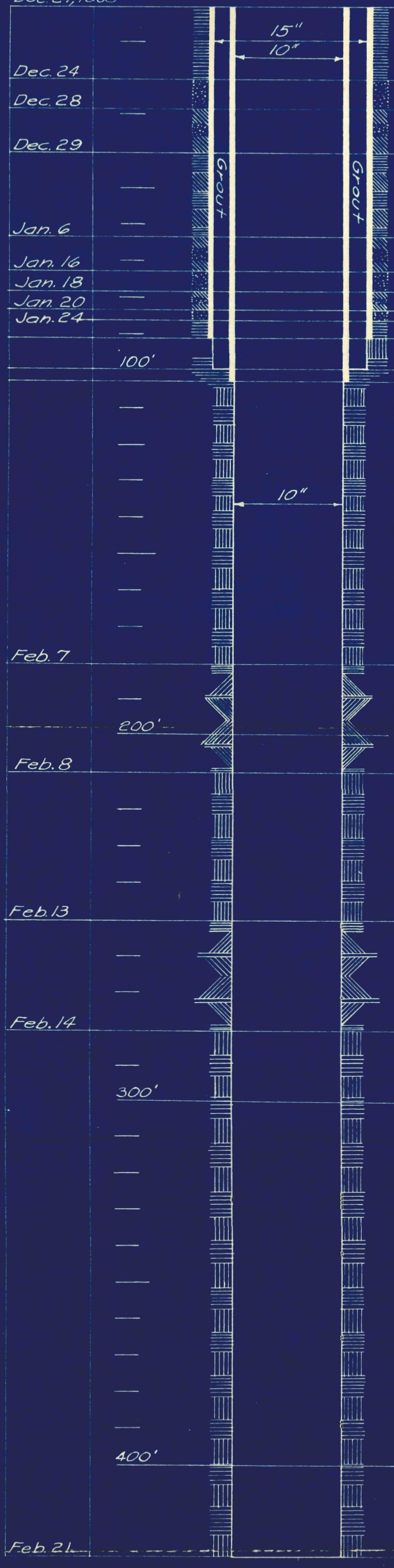
Finished inside dia. uniform at 10": casing upper 103' using 10" genuine wrought iron set in neat cement grout; outside liner upper 90', inside dia. 14.25"



Static level - 87'

Dec. 24, 1938

0 = Sea Level +



	Depth Below Surface	
Dec. 24	20'	Clay
Dec. 28	28'	Sand
Dec. 29	40'	Sand & Blue Clay
Jan. 6	63'	Blue Clay
Jan. 16	73'	Sand & Blue Clay
Jan. 18	78'	Sand
Jan. 20	83'	Sand & Clay
Jan. 24	86'	Sand
	100'	
	103'	
Feb. 7	180'	Lime Stone
Feb. 8	210'	Lime Stone & Shale
Feb. 13	250'	Lime Stone
Feb. 14	280'	Lime Stone & Shale
Feb. 21	456'	Lime Stone

LOG OF MUNICIPAL WELL
ATKINS IOWA
PROJECT DOCKET IA. 1694-F

HOWARD R. GREEN CO. ENGINEERS

CEDAR RAPIDS IOWA

1938-1939

	Day Set	Day After
Static Level	2/2/39	9.0
Set 10" casing	2/3/39	
Static Level	2/9/39	60.
Static Level	2/21/39	87.

REPORT ON CONSTRUCTION AND CHARACTERISTICS OF
MUNICIPAL WELL
Atkins, Iowa
Section "A", Municipal Waterworks System
Docket Iowa 1694-F

Owner: Incorporated Town of Atkins, Iowa

Engineers: Howard R. Green Company, Cedar Rapids, Iowa

General Contractor: Dan Christensen Const. Co., Cedar Rapids, Iowa

Well Driller: Chas. D. Nolan, Cedar Rapids, Iowa

Date drilling was started: December 24, 1938.

Date drilling was completed: February 21, 1939.

Total depth of well: 456 feet

Finished inside diameter uniform at 10"; casing upper 103 ft. using 10" genuine wrought iron set in neat cement grout; outside liner upper 90 ft., inside diameter 14.25 inches. General description: Reference is hereby made to the attached graphical log of the well showing the dates, depth, diameter, casing location and formations penetrated. The surface drift at this point consisted largely of layers of clay, sand and gravel well saturated with water and approximately one hundred feet (100') deep. The static water level during this period of drilling was in the neighborhood of nine feet (9') below the surface of the ground. When the well had been drilled at a diameter of 15" to the top of rock and the outside liner of nominal 15" diameter had been set to rock, the inside casing of 10" genuine wrought iron was set and temporarily sealed at the bottom with clay. During the balance of the drilling operations the static water level between the inside and outside casings remained stable but the static water level within the 10" hole dropped to a range of from sixty (60') to eighty-seven (87') below the surface.

The designed depth of the well was three hundred feet (300') and when this depth had been reached a bailing test was run to determine the productivity of the well at that point. The well was bailed at the rate of fourteen (14) g.p.m. but the draw down was extreme and the specific capacity was in the neighborhood of one-fourth (1/4) gallon per minute per foot of draw down. Therefore, drilling was ordered continued and when a depth of approximately four hundred feet (400') had been reached indications of an increased flow of water were noted. The drilling was continued to the final depth of four hundred fifty-six feet (456'), the formation at that point being soft limestone. A displacement type of

test pump was installed designed to be operated by the drilling rig. The working barrel was 6" inside diameter. The static water level was eighty-five feet (85') below the surface. The pump cylinder was set one hundred forty-six feet (146') below the surface. A one-fourth inch (1/4") air pipe with altitude gage calibrated to read in feet was installed with its open end one hundred forty-six feet (146') below the surface. The initial reading on the altitude gage under static conditions was sixty-one feet (61'). The suction inlet of the pump was one hundred fifty-two feet (152') below the surface. The pump was calibrated by displacement tests as follows. One hundred thirty-two strokes (132) filled a two hundred sixty-two (262) gallon tank, equals 1.98 gallons per stroke. A preliminary test to determine the specific capacity at various rates of pumping was started at 2:29 p.m. February 24.

After 17 minutes of operation at 36.6 g.p.m. the draw down was 17.0 ft. using a specific capacity of 2.15.

At 3:00 p.m. after 13 minutes pumping at 54.8 g.p.m. the draw down was 33.5 ft. for a specific capacity of 1.64.

At 3:37 p.m. after a 15 minute run at 71.0 g.p.m. the draw down was 44.5 ft. for a specific capacity of 1.60.

At 4:00 p.m. after a 15 minute run at 80 g.p.m. the draw down was 53 ft. for a specific capacity of 1.51.

It was therefore determined to run the twenty-four hour test at or about a uniform rate of sixty (60) g.p.m. This test was started at 11:30 p.m., February 24, and continued until 11:30 p.m. February 25. The number of strokes per minute was kept as uniform as possible. The pump was calibrated two additional times during the run to check any slippage in the cylinder. The draw down was noted at least once each hour. A table of hourly results is as follows:

Time	Draw Down	Rate of Pumping	Specific Capacity
February 25			
12:30 a.m.	41	60	1.46
1:30 a.m.	43	61	1.42
2:30 a.m.	45	62	1.38
3:30 a.m.	46	62	1.35
4:30 a.m.	47	62	1.32
5:30 a.m.	47	63	1.34
6:30 a.m.	46	63	1.37
7:30 a.m.	47	64	1.36
8:30 a.m.	48	65	1.36
9:30 a.m.	48	65	1.36
10:30 a.m.	47	64	1.36
11:30 a.m.	51	69	1.35
12:30 p.m.	51	69	1.35

Time	Draw Down	Rate of Pumping	Specific Capacity
February 25			
1:30 p.m.	47	64	1.35
2:30 p.m.	47	64	1.36
3:30 p.m.	46	63	1.37
4:30 p.m.	46	63	1.37
5:30 p.m.	46	63	1.37
6:30 p.m.	47	64	1.36
7:30 p.m.	46	63	1.37
8:30 p.m.	46	63	1.37
9:30 p.m.	46	63	1.37
10:30 p.m.	46	63	1.37
11:30 p.m.	46	63	1.37

Recovery Test

Upon completion of the twenty-four hour pumping test the recovery of the static water level was noted by gage readings at five minute intervals until the original static water level was noted at five minute intervals. The rate of recovery was very satisfactory being 74% in the first five minutes. The table of results follows:

Time	Draw Down	Percent Recovery
11:30 p.m.	46	--
11:35 p.m.	12	74%
11:40 p.m.	9	81%
11:45 p.m.	7	85%
11:50 p.m.	5	89%
11:55 p.m.	4	91%
12:00	4	91%
12:05 a.m.	4	91%
12:10 a.m.	3	94%
12:15 a.m.	3	94%
12:20 a.m.	3	94%
12:25 a.m.	2	96%
12:30 a.m.	1	98%
12:35 a.m.	1	98%
12:40 a.m.	-	100%

Attached hereto is a copy of the chemical and mineral analysis report made on a one gallon sample taken at the end of the twenty-four hour test and made by the State Hygienic Laboratory at Iowa City.

Respectfully submitted,

HOWARD R. GREEN COMPANY, ENGINEERS

By H R Green

HRG:V

HOWARD R. GREEN CO.
Consulting Engineers
208-209-210 BEVER BUILDING, CEDAR RAPIDS, IOWA

WATER SUPPLY AND TREATMENT
SEWERS AND SEWAGE DISPOSAL
STRUCTURES, BRIDGES, BUILDINGS
UTILITY VALUATIONS, RATES
INVESTIGATIONS, REPORTS

February 13, 1940

Dr. H. G. Hershey
Iowa Geological Survey
Iowa City, Iowa

Subj: Atkins, Iowa, Well

Dear Dr. Hershey:

I was at Atkins yesterday. You may remember my telling you that the Fairbanks, Morse & Co. pump which was installed in the municipal well did not come up to guaranteed efficiencies. At the present time they are placing a new unit in the well. The discharge column which has been removed from the well shows considerable corrosion above the static water line. The pump is only operated about an hour and a half a day so the static water line is maintained perhaps 90% of the time. On the exterior of the discharge column below water line is a coal black greasy deposit. The same conditions were noted on the exterior of the shaft tubing. In the turbine pump itself (cast iron case and bronze impellers) there appears to be some softening action in the cast iron contact surfaces.

I wish you would look at your copy of the mineral water analysis of March 3, 1939, under Your No. 130684, and see if you can throw any light on the situation. I note that no CO_2 determination was made but the pH is shown at 6.9 and the sulfate radical at 13.2. The water has a distinct sulphurous odor and it is noticeable to taste and smell at consumers' taps. I think possibly we can check the corrosive action within the pump itself by introducing a small quantity of milk of lime every time the pump is thrown out of operation. My suspicion is that the corrosion above water line is caused by released gases and I do not know whether creating a circulation of air above water line would be worth while or not. I think it is going to be necessary to aerate the water before discharging into the system to remove the objectionable taste and odor, but I would like to get your reaction to the progressive corrosion which seems to be taking place in view of the available analysis.

Yours very truly,

HOWARD R. GREEN COMPANY

By H R Green

HRG:V

Talked this over with Mr Green on Feb 16 in his office suggested pantry outside line at end of pump house above water line and introduction of alkaline solution into inside of pump line at end of each pumping period 7 PM

HOWARD R. GREEN CO
CONSULTING ENGINEERS
208-210 BEVER BLDG.
CEDAR RAPIDS, IOWA

February 8, 1941

Mr. H. A. Haerther, Mayor
Atkins, Iowa

Dear Mr. Haerther:

The day before yesterday I received from Dr. Hershey of the State Geological Survey a further report on the Atkins water. I think it would be well to review in a preliminary way what the situation is. To say the least, it is puzzling and before we make any definite recommendations to you I want to get some prices on equipment and to study into the rather mysterious situation further.

You will remember that we had samples of the well water which had stood in the discharge column of the pump over night analyzed as well as water taken from the pump after fifteen minutes of operation. We did this for two purposes. We wanted to compare the analysis of the water itself and also to get an analysis of the sludge which was discoloring the first water pumped.

Our theory is that, due to the fact that the first water pumped is discolored and clears up afterwards, the water is perhaps attacking the metal work of the pump and discharge pipe during a period of ten or twelve hours retention in the pipe. If this is true I cannot see why the water pumped out in the mains may not be having the same effect on the iron pipe of the distribution system.

You will remember that we had an analysis made February 25, 1939, that is, about two years ago when the well was first operated, and there have apparently been some changes in the quality of water secured from the well. The total solids have increased from 415 to 532. The alkalinity has decreased from 414 to 370. The alkalies as sodium have decreased from 65.6 to 54.5. Calcium has increased from 71.5 to 82.9. The pH or acidity of the water which stood at a pH of 6.9 has been eliminated and the pH is now at the neutral point of 7.0. The iron has greatly increased from

0.3 to 1.1. The Fluorine has decreased from 1.0 to a trace. The chlorine has increased from 3.0 to 7.0. The sulfate (SO_4) has increased from 13.2 to 102.9. The bicarbonate has decreased from 505 to 451. The hardness has increased from 283 to 345 or from 16.5 grains per gallon to 20.1 grains per gallon. All of the foregoing numerals apply to parts per million.

After the pump has been in operation for fifteen minutes or more the water is clear but the water which has been retained in the discharge column over night is cloudy. Water siphoned off the top of the sample jug after standing shows total solids of 435 which is only slightly greater than the sample taken two years ago. The water is still neutral as to acidity, the pH standing at 7.0, the calcium and magnesium are reduced. The iron has practically disappeared. The sulfate has dropped from 102 to 31 parts per million and the hardness has decreased from 20.1 grains to 16.2 grains.

In a preliminary way I would say that it will be necessary to remove the dissolved gases from the water and to aerate it and to follow that treatment by filtration. We will, therefore, try to get some equipment prices immediately and make a definite recommendation and report to you at the earliest possible date. In the meantime if any of you should be in Cedar Rapids I will be glad to discuss the matter with you further. However, if you prefer that I come out for a meeting of the council, I will be glad to do so although I would rather wait until we have a little more definite opinion.

Yours very truly,

HOWARD R. GREEN COMPANY

By H. R. Green

HRG:V
cc Dr. H. G. Hershey
The Dorr Company

P.S. I forgot to state that Dr. Hershey's examination of the sludge which settled out of the water was that it was 40% calcite (pure limestone) and 60% limonite (iron oxide). The calcite was in crystal form and its presence is hard to explain.

WRD Exp. (GW)
April 1966

Well No. 083-09W-14 DBB

WELL SCHEDULE

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

MASTER CARD

Record by KARSTEN Source of data FILE Date 6/24/69 Map BENTON CO. HWY

State IOWA [16] County (or town) BENTON [06]

Latitude: 41 59 57 N (deg, min, sec) Longitude: 091 51 36 (degrees, min, sec) Sequential number: 1

Lat-long accuracy: 2 T 83 S, R 9 W Sec 14, NW ¼, NW ¼, SE ¼, 5 B & M

Local well number: 083 09 W 14 D B B Other number: W-0973

Local use: 00973 Owner or name: ATKINS TOWN WELL #1

Owner or name: ATKINS TOWN NO 1 Address: ATKINS, IA.

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

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

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]

DATA AVAILABLE: Well data [1] Freq. W/L meas.: [0] Field aquifer char.

Hyd. lab. data:

Qual. water data; type: [C]

Freq. sampling: [I] Pumpage inventory: yes / no, period:

Aperture cards: yes

Log data: GEOLOGIST [G]

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 456 ft Meas. [4 5 6] rept accuracy [3]

Depth cased: (first perf.) 103 ft [1 0 3] Casing type: STEEL ; Diam. 10 in [1 0]

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (Q) open end, (P) perf., screen, sd. pt., (S) (I) (W) shored, (N) open hole, (Z) other — [X]

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 — [C]

Date Drilled: 2/21/39 [9 3 9] Pump intake setting: fr

Driller: C. O. NOLAN (name), CEDAR RAPIDS, 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 — Deep / Shallow

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

Descrip. MP LSD ft above/below LSD, Alt. MP 833

Alt. LSD: 833 [8 3 3] Accuracy: (source) ALT [7]

Water Level 87 ft above/below MP; Ft above/below LSD [8 7] Accuracy: [D]

Date meas: 2/21/39 [2 3 9] Yield: 60 gpm [6 0] Method determined [3]

Drawdown: 46 ft [4 6] Accuracy: [3] Pumping period hrs

QUALITY OF WATER DATA: Iron 0.14 ppm [2] Sulfate 37 ppm [2] Chloride 1.0 ppm [0] Hard. 271 ppm [6]

Sp. Conduct 601 K x 10^6 [4] Temp. 52 °F [5 2] Date sampled 4/16/53 [4 5 3]

Taste, color, etc.

Well No. 083-09W-14 DBB

Well No. 083 - 05W - 14 DBB

Latitude-longitude 41 d 59 m 57 s N 091 d 51 m 36 s W

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD (1–19) Physiographic Province: CONT. L.L. (20–21) 12 Section: DISS. TILL

PLAINS E (22) Drainage Basin: CEDAR (23–25) 25E Subbasin: (26)

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

MAJOR AQUIFER: SIL system, ALEX. series (28–29) SA aquifer, formation, group KANKAKEE (30–31) AK

Lithology: CHERTY DOL (32–33) QD Origin: MARINE 6 (34) Aquifer Thickness: 31 ft

31 (35–37) Length of well open to: ft (38–40) Depth to top of: ft (41–43)

MINOR AQUIFER: SIL system, series (44–45) S~~K~~ aquifer, formation, group ~~X~~ (46–47)

Lithology: CHERTY DOL (48–49) QD Origin: MARINE 6 (50) Aquifer Thickness: 175 ft

175 (51–53) Length of well open to: ft (54–56) Depth to top of: ft (57–59)

Intervals Screened:

Depth to consolidated rock: 83 ft (60–63) 83 Source of data: C (64)

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

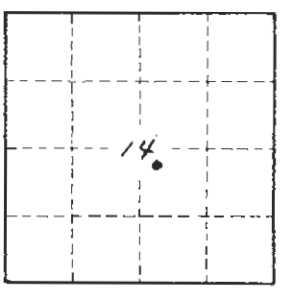
Surficial material: (70–71) Infiltration characteristics: (72)

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

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

CASING:

10" 0-103'



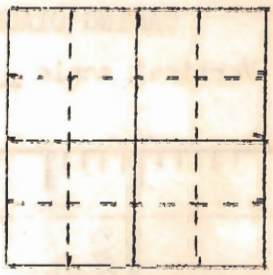
Well No. 083-05W-14 DBB

GPO 857-703

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

W-0973

RECORD OF WELL



Location:

Town: Atkins (N E S W); County Benton

NW/c SE¼ sec. 14 T. 83 N., R. 9 W. FREMONT Twp.

Well name and number Atkins Town Well #1

Owner Incorporated town of Atkins Address

Tenant Address

Engineers HOWARD R GREEN Co; Cedar Rapids

Contractor Don Christensen Const. Co. Address Cedar Rapids, Iowa

Drillers Chas. D. Nolan, Cedar Rapids

Drilling dates Dec 24, 1938 - Feb 21, 1939

Well data:

Elevations: Drilling curb 833' feet; Land surface feet

Determined by

Topographic position Upland Slope

Total depth: Reported 456 feet, Measured feet

Drilling method

Hole and casing data 10" diameter 0-456' T.D.; 103' of 16" wrought iron
(Give amount, size, kind, and depth of all casing; type and
casing set in cement grout; outside liner upper 90'; inside
position of seals and packers, cementing; how finished--perforated pipe, screen,
diameter 14.25"
gravel pack, open hole, etc.)

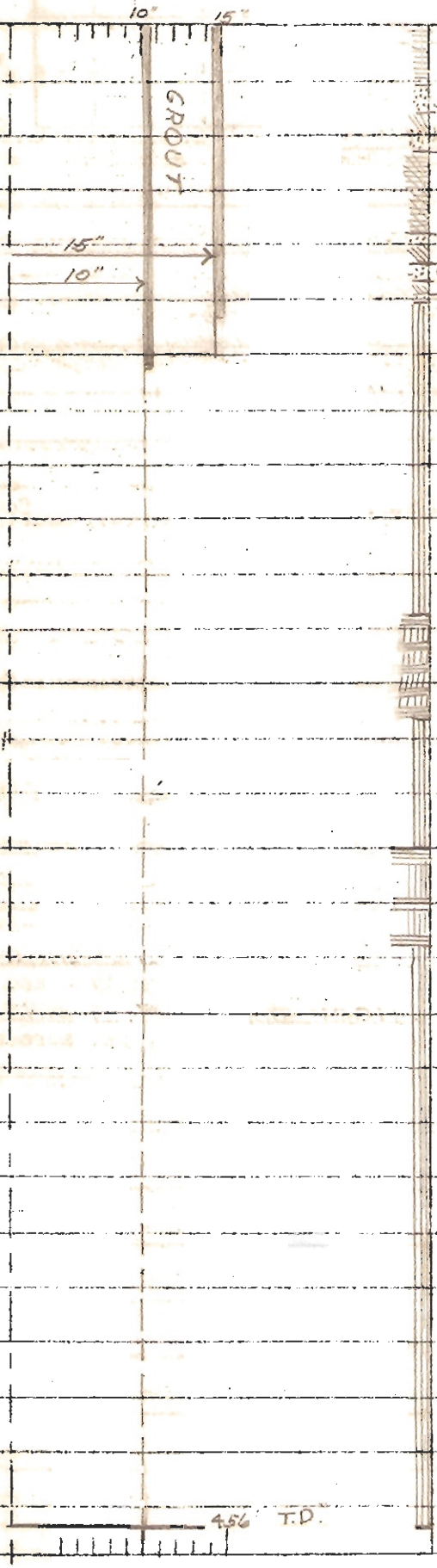
Original depth to water ft. above / below Date

Original elevation of water level ft.; Source of data

Sources of water: Principal Silurian; Others

CASING DIAGRAM

Vertical scale 1" = 50'



LOG

Clay 0-20'
Sand 20-28'
Sand & blue clay 28'-40'
Blue clay 40'-63'
Sand & Blue clay 63'-73'
Sand 73'-78'
Clay 78'-83'
Slate 83'-86'

Limestone 86'-180'

Limestone & Shale 180'-210'

Limestone 210'-250'

Limestone & Shale 250'-280'

Limestone 280'-456'

Production data: Date Feb. 25, 1939

Static depth to water 85' Measuring point surface

Pumping level 136' at 69 g.p.m.

131' 63

Specific capacity ____ g.p.m. per ft. drawdown; Temperature 51½ °F.

Pump data; Type pump Cylinder Column Dia. 6" Length ____

Cylinder or bowls: Dia. ____ Length ____ Suction pipe ____

Power D Airline ____

Estimated rate of production: 60 g.p.m. for 24 hrs. a day

Use of water public supply

WATER ANALYSES (in parts per million)

Date sampled	Feb 25 1939	Dec. 1940	Dec. 1940	
Sampled by	H.R. Green	Hershey	Hershey	
Total solids	422	532	435	
Insoluble matter	12.8	9.0	4.0	
Alkalinity (Meo)	414.0	370.0	376.0	
Alkalinity (Phn)	0.0	0.0	0.0	
pH	6.9	7.0	7.0	
Fe_2O_3+ Mn_2O_3+Al_2O_3	4.0	2.0	1.0	
Alkali as sodium	66.7	54.5	51.8	
Calcium	72.0	82.9	23.6	
Magnesium	23.7	33.0	22.7	
Iron (unfiltered)	0.1	1.1	0.1*	
Manganese	0.00	0.00	0.00	
Nitrate	0.00	0.00	0.00	
Fluoride	1.00	Tr	Tr.	
Chloride	3.00	7.0	6.0	
Sulfate	21.4	102.9	31.3	
Bicarbonate	505.1	451.4	458.7	
Hardness (ppm)	277	345	277	
Hardness (gpg)	16.2	20.1	16.2	

Remarks * Fe may be low. Sample decanted.

Laboratory data: Sample storage location A E 4

Sample range 0-456 No. spls. ____ No. dupls. & cond. ____

Spls. prepared by ____ Washed range ____ by ____

Driller's log and cond. Yes excellent

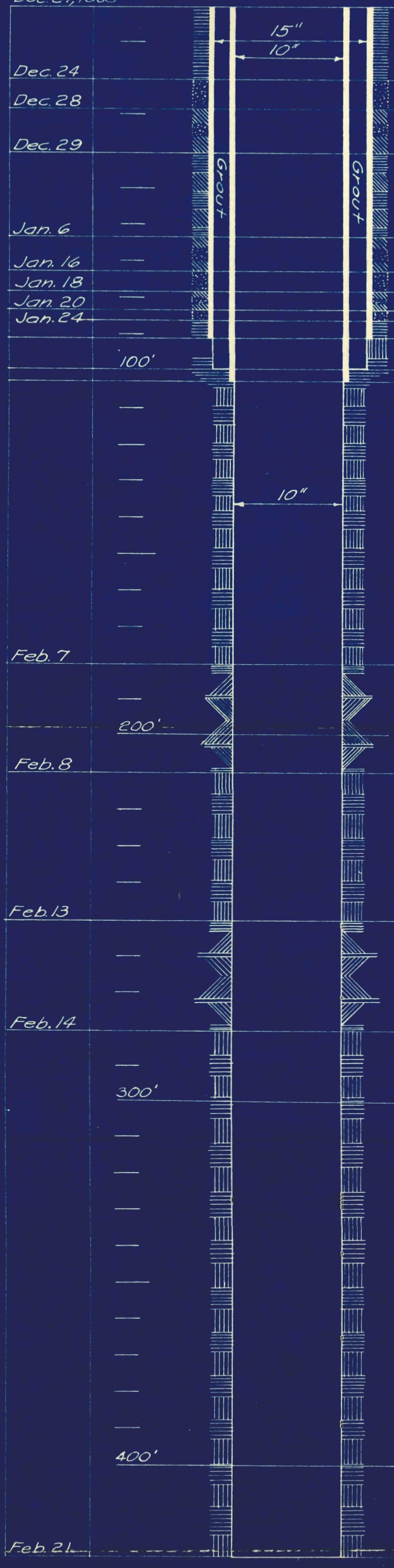
Insoluble residues: Prepared by ____ Studied by ____ Strip log ____

Microscopic study 0-456 strip log Gardner 1939; Milton & Hawkins 1942

Gen. log ____ Correl. by Gardner

Dec. 24, 1938

0 = Sea Level +



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	103'	
Feb. 7	180'	Lime Stone
Feb. 8	210'	Lime Stone & Shale
Feb. 13	250'	Lime Stone
Feb. 14	280'	Lime Stone & Shale
Feb. 21	456'	Lime Stone

LOG OF MUNICIPAL WELL
ATKINS IOWA
PROJECT DOCKET IA. 1694-F

HOWARD R. GREEN CO. ENGINEERS

CEDAR RAPIDS IOWA

1938-1939

	Day Set	Day After
Static Level	2/2/39	9.0
Set 10" casing	2/3/39	
Static Level	2/9/39	60.
Static Level	2/21/39	87.

REPORT ON CONSTRUCTION AND CHARACTERISTICS OF
MUNICIPAL WELL
Atkins, Iowa
Section "A", Municipal Waterworks System
Docket Iowa 1694-F

Owner: Incorporated Town of Atkins, Iowa

Engineers: Howard R. Green Company, Cedar Rapids, Iowa

General Contractor: Dan Christensen Const. Co., Cedar Rapids, Iowa

Well Driller: Chas. D. Nolan, Cedar Rapids, Iowa

Date drilling was started: December 24, 1938.

Date drilling was completed: February 21, 1939.

Total depth of well: 456 feet

Finished inside diameter uniform at 10"; casing upper 103 ft. using 10" genuine wrought iron set in neat cement grout; outside liner upper 90 ft., inside diameter 14.25 inches. General description: Reference is hereby made to the attached graphical log of the well showing the dates, depth, diameter, casing location and formations penetrated. The surface drift at this point consisted largely of layers of clay, sand and gravel well saturated with water and approximately one hundred feet (100') deep. The static water level during this period of drilling was in the neighborhood of nine feet (9') below the surface of the ground. When the well had been drilled at a diameter of 15" to the top of rock and the outside liner of nominal 15" diameter had been set to rock, the inside casing of 10" genuine wrought iron was set and temporarily sealed at the bottom with clay. During the balance of the drilling operations the static water level between the inside and outside casings remained stable but the static water level within the 10" hole dropped to a range of from sixty (60') to eighty-seven (87') below the surface.

The designed depth of the well was three hundred feet (300') and when this depth had been reached a bailing test was run to determine the productivity of the well at that point. The well was bailed at the rate of fourteen (14) g.p.m. but the draw down was extreme and the specific capacity was in the neighborhood of one-fourth (1/4) gallon per minute per foot of draw down. Therefore, drilling was ordered continued and when a depth of approximately four hundred feet (400') had been reached indications of an increased flow of water were noted. The drilling was continued to the final depth of four hundred fifty-six feet (456'), the formation at that point being soft limestone. A displacement type of

test pump was installed designed to be operated by the drilling rig. The working barrel was 6" inside diameter. The static water level was eighty-five feet (85') below the surface. The pump cylinder was set one hundred forty-six feet (146') below the surface. A one-fourth inch (1/4") air pipe with altitude gage calibrated to read in feet was installed with its open end one hundred forty-six feet (146') below the surface. The initial reading on the altitude gage under static conditions was sixty-one feet (61'). The suction inlet of the pump was one hundred fifty-two feet (152') below the surface. The pump was calibrated by displacement tests as follows. One hundred thirty-two strokes (132) filled a two hundred sixty-two (262) gallon tank, equals 1.98 gallons per stroke. A preliminary test to determine the specific capacity at various rates of pumping was started at 2:29 p.m. February 24.

After 17 minutes of operation at 36.6 g.p.m. the draw down was 17.0 ft. using a specific capacity of 2.15.

At 3:00 p.m. after 13 minutes pumping at 54.8 g.p.m. the draw down was 33.5 ft. for a specific capacity of 1.64.

At 3:37 p.m. after a 15 minute run at 71.0 g.p.m. the draw down was 44.5 ft. for a specific capacity of 1.60.

At 4:00 p.m. after a 15 minute run at 80 g.p.m. the draw down was 53 ft. for a specific capacity of 1.51.

It was therefore determined to run the twenty-four hour test at or about a uniform rate of sixty (60) g.p.m. This test was started at 11:30 p.m., February 24, and continued until 11:30 p.m. February 25. The number of strokes per minute was kept as uniform as possible. The pump was calibrated two additional times during the run to check any slippage in the cylinder. The draw down was noted at least once each hour. A table of hourly results is as follows:

Time	Draw Down	Rate of Pumping	Specific Capacity
February 25			
12:30 a.m.	41	60	1.46
1:30 a.m.	43	61	1.42
2:30 a.m.	45	62	1.38
3:30 a.m.	46	62	1.35
4:30 a.m.	47	62	1.32
5:30 a.m.	47	63	1.34
6:30 a.m.	46	63	1.37
7:30 a.m.	47	64	1.36
8:30 a.m.	48	65	1.36
9:30 a.m.	48	65	1.36
10:30 a.m.	47	64	1.36
11:30 a.m.	51	69	1.35
12:30 p.m.	51	69	1.35

Time	Draw Down	Rate of Pumping	Specific Capacity
February 25			
1:30 p.m.	47	64	1.35
2:30 p.m.	47	64	1.36
3:30 p.m.	46	63	1.37
4:30 p.m.	46	63	1.37
5:30 p.m.	46	63	1.37
6:30 p.m.	47	64	1.36
7:30 p.m.	46	63	1.37
8:30 p.m.	46	63	1.37
9:30 p.m.	46	63	1.37
10:30 p.m.	46	63	1.37
11:30 p.m.	46	63	1.37

Recovery Test

Upon completion of the twenty-four hour pumping test the recovery of the static water level was noted by gage readings at five minute intervals until the original static water level was noted at five minute intervals. The rate of recovery was very satisfactory being 74% in the first five minutes. The table of results follows:

Time	Draw Down	Percent Recovery
11:30 p.m.	46	--
11:35 p.m.	12	74%
11:40 p.m.	9	81%
11:45 p.m.	7	85%
11:50 p.m.	5	89%
11:55 p.m.	4	91%
12:00	4	91%
12:05 a.m.	4	91%
12:10 a.m.	3	94%
12:15 a.m.	3	94%
12:20 a.m.	3	94%
12:25 a.m.	2	96%
12:30 a.m.	1	98%
12:35 a.m.	1	98%
12:40 a.m.	-	100%

Attached hereto is a copy of the chemical and mineral analysis report made on a one gallon sample taken at the end of the twenty-four hour test and made by the State Hygienic Laboratory at Iowa City.

Respectfully submitted,

HOWARD R. GREEN COMPANY, ENGINEERS

By H R Green

HRG:V

HOWARD R. GREEN CO.
Consulting Engineers
208-209-210 BEVER BUILDING, CEDAR RAPIDS, IOWA

WATER SUPPLY AND TREATMENT
SEWERS AND SEWAGE DISPOSAL
STRUCTURES, BRIDGES, BUILDINGS
UTILITY VALUATIONS, RATES
INVESTIGATIONS, REPORTS

February 13, 1940

Dr. H. G. Hershey
Iowa Geological Survey
Iowa City, Iowa

Subj: Atkins, Iowa, Well

Dear Dr. Hershey:

I was at Atkins yesterday. You may remember my telling you that the Fairbanks, Morse & Co. pump which was installed in the municipal well did not come up to guaranteed efficiencies. At the present time they are placing a new unit in the well. The discharge column which has been removed from the well shows considerable corrosion above the static water line. The pump is only operated about an hour and a half a day so the static water line is maintained perhaps 90% of the time. On the exterior of the discharge column below water line is a coal black greasy deposit. The same conditions were noted on the exterior of the shaft tubing. In the turbine pump itself (cast iron case and bronze impellers) there appears to be some softening action in the cast iron contact surfaces.

I wish you would look at your copy of the mineral water analysis of March 3, 1939, under Your No. 130684, and see if you can throw any light on the situation. I note that no CO_2 determination was made but the pH is shown at 6.9 and the sulfate radical at 13.2. The water has a distinct sulphurous odor and it is noticeable to taste and smell at consumers' taps. I think possibly we can check the corrosive action within the pump itself by introducing a small quantity of milk of lime every time the pump is thrown out of operation. My suspicion is that the corrosion above water line is caused by released gases and I do not know whether creating a circulation of air above water line would be worth while or not. I think it is going to be necessary to aerate the water before discharging into the system to remove the objectionable taste and odor, but I would like to get your reaction to the progressive corrosion which seems to be taking place in view of the available analysis.

Yours very truly,

HOWARD R. GREEN COMPANY

By H R Green

HRG:V

Talked this over with Mr Green on Feb 16 in his office suggested pantry outside line at end of pump house above water line and introduction of alkaline solution into inside of pump line at end of each pumping period 7 PM

HOWARD R. GREEN CO
CONSULTING ENGINEERS
208-210 BEVER BLDG.
CEDAR RAPIDS, IOWA

February 8, 1941

Mr. H. A. Haerther, Mayor
Atkins, Iowa

Dear Mr. Haerther:

The day before yesterday I received from Dr. Hershey of the State Geological Survey a further report on the Atkins water. I think it would be well to review in a preliminary way what the situation is. To say the least, it is puzzling and before we make any definite recommendations to you I want to get some prices on equipment and to study into the rather mysterious situation further.

You will remember that we had samples of the well water which had stood in the discharge column of the pump over night analyzed as well as water taken from the pump after fifteen minutes of operation. We did this for two purposes. We wanted to compare the analysis of the water itself and also to get an analysis of the sludge which was discoloring the first water pumped.

Our theory is that, due to the fact that the first water pumped is discolored and clears up afterwards, the water is perhaps attacking the metal work of the pump and discharge pipe during a period of ten or twelve hours retention in the pipe. If this is true I cannot see why the water pumped out in the mains may not be having the same effect on the iron pipe of the distribution system.

You will remember that we had an analysis made February 25, 1939, that is, about two years ago when the well was first operated, and there have apparently been some changes in the quality of water secured from the well. The total solids have increased from 415 to 532. The alkalinity has decreased from 414 to 370. The alkalies as sodium have decreased from 65.6 to 54.5. Calcium has increased from 71.5 to 82.9. The pH or acidity of the water which stood at a pH of 6.9 has been eliminated and the pH is now at the neutral point of 7.0. The iron has greatly increased from

0.3 to 1.1. The Fluorine has decreased from 1.0 to a trace. The chlorine has increased from 3.0 to 7.0. The sulfate (SO_4) has increased from 13.2 to 102.9. The bicarbonate has decreased from 505 to 451. The hardness has increased from 283 to 345 or from 16.5 grains per gallon to 20.1 grains per gallon. All of the foregoing numerals apply to parts per million.

After the pump has been in operation for fifteen minutes or more the water is clear but the water which has been retained in the discharge column over night is cloudy. Water siphoned off the top of the sample jug after standing shows total solids of 435 which is only slightly greater than the sample taken two years ago. The water is still neutral as to acidity, the pH standing at 7.0, the calcium and magnesium are reduced. The iron has practically disappeared. The sulfate has dropped from 102 to 31 parts per million and the hardness has decreased from 20.1 grains to 16.2 grains.

In a preliminary way I would say that it will be necessary to remove the dissolved gases from the water and to aerate it and to follow that treatment by filtration. We will, therefore, try to get some equipment prices immediately and make a definite recommendation and report to you at the earliest possible date. In the meantime if any of you should be in Cedar Rapids I will be glad to discuss the matter with you further. However, if you prefer that I come out for a meeting of the council, I will be glad to do so although I would rather wait until we have a little more definite opinion.

Yours very truly,

HOWARD R. GREEN COMPANY

By H. R. Green

HRG:V
cc Dr. H. G. Hershey
The Dorr Company

P.S. I forgot to state that Dr. Hershey's examination of the sludge which settled out of the water was that it was 40% calcite (pure limestone) and 60% limonite (iron oxide). The calcite was in crystal form and its presence is hard to explain.

WRD Exp. (GW)
April 1966

Well No. 083-09W-14 DBB

WELL SCHEDULE

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

MASTER CARD

Record by KARSTEN Source of data FILE Date 6/24/69 Map BENTON CO. HWY

State IOWA [16] County (or town) BENTON [06]

Latitude: 41 59 57 N (deg, min, sec) Longitude: 091 51 36 (degrees, min, sec) Sequential number: 1

Lat-long accuracy: 2 T 83 S, R 9 W Sec 14, NW ¼, NW ¼, SE ¼, 5 B & M

Local well number: 083 09 W 14 D B B Other number: W-0973

Local use: 00973 Owner or name: ATKINS TOWN WELL #1

Owner or name: ATKINS TOWN NO 1 Address: ATKINS, IA.

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

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

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]

DATA AVAILABLE: Well data [1] Freq. W/L meas.: [0] Field aquifer char.

Hyd. lab. data:

Qual. water data; type: [C]

Freq. sampling: [I] Pumpage inventory: yes / no, period:

Aperture cards: yes

Log data: GEOLOGIST [G]

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 456 ft Meas. [4 5 6] rept accuracy [3]

Depth cased: (first perf.) 103 ft [1 0 3] Casing type: STEEL ; Diam. 10 in [1 0]

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (Q) open end, (P) perf., screen, sd. pt., (S) (I) (W) shored, (N) open hole, (Z) other — [X]

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 — [C]

Date Drilled: 2/21/39 [9 3 9] Pump intake setting: fr

Driller: C. O. NOLAN (name), CEDAR RAPIDS, 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 — Deep / Shallow

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

Descrip. MP LSD ft above/below LSD, Alt. MP 833

Alt. LSD: 833 [8 3 3] Accuracy: (source) ALT [7]

Water Level 87 ft above/below MP; Ft above/below LSD [8 7] Accuracy: [D]

Date meas: 2/21/39 [2 3 9] Yield: 60 gpm [6 0] Method determined [3]

Drawdown: 46 ft [4 6] Accuracy: [3] Pumping period hrs

QUALITY OF WATER DATA: Iron 0.14 ppm [2] Sulfate 37 ppm [2] Chloride 1.0 ppm [0] Hard. 271 ppm [6]

Sp. Conduct 601 K x 10^6 [4] Temp. 52 °F [5 2] Date sampled 4/16/53 [4 5 3]

Taste, color, etc.

Well No. 083-09W-14 DBB

Well No. 083 - 05W - 14 DBB

Latitude-longitude 41 d 59 m 57 s N 091 d 51 m 36 s W

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD (1–19) Physiographic Province: CONT. L.L. (20–21) 12 Section: DISS. TILL

PLAINS E (22) Drainage Basin: CEDAR (23–25) 25E Subbasin: (26)

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

MAJOR AQUIFER: SIL system, ALEX. series (28–29) SA aquifer, formation, group KANKAKEE (30–31) AK

Lithology: CHERTY DOL (32–33) QD Origin: MARINE 6 (34) Aquifer Thickness: 31 ft

31 (35–37) Length of well open to: ft (38–40) Depth to top of: ft (41–43)

MINOR AQUIFER: SIL system, series (44–45) S~~K~~ aquifer, formation, group ~~X~~ (46–47)

Lithology: CHERTY DOL (48–49) QD Origin: MARINE 6 (50) Aquifer Thickness: 175 ft

175 (51–53) Length of well open to: ft (54–56) Depth to top of: ft (57–59)

Intervals Screened:

Depth to consolidated rock: 83 ft (60–63) 83 Source of data: C (64)

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

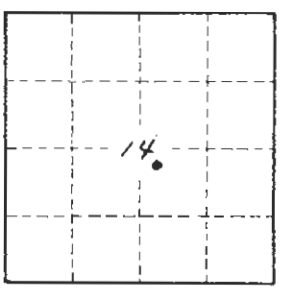
Surficial material: (70–71) Infiltration characteristics: (72)

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

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

CASING:

10" 0-103'



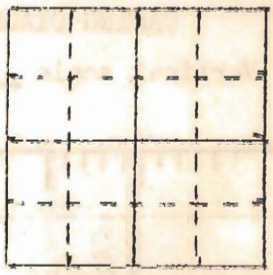
Well No. 083-05W-14 DBB

GPO 857-703

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

W-0973

RECORD OF WELL



Location:

Town: Atkins (N E S W); County Benton

NW/c SE¼ sec. 14 T. 83 N., R. 9 W. FREMONT Twp.

Well name and number Atkins Town Well #1

Owner Incorporated town of Atkins Address

Tenant Address

Engineers HOWARD R GREEN Co; Cedar Rapids

Contractor Don Christensen Const. Co. Address Cedar Rapids, Iowa

Drillers Chas. D. Nolan, Cedar Rapids

Drilling dates Dec 24, 1938 - Feb 21, 1939

Well data:

Elevations: Drilling curb 833' feet; Land surface feet

Determined by

Topographic position Upland Slope

Total depth: Reported 456 feet, Measured feet

Drilling method

Hole and casing data 10" diameter 0-456' T.D.; 103' of 16" wrought iron
(Give amount, size, kind, and depth of all casing; type and
casing set in cement grout; outside liner upper 90'; inside
position of seals and packers, cementing; how finished--perforated pipe, screen,
diameter 14.25"
gravel pack, open hole, etc.)

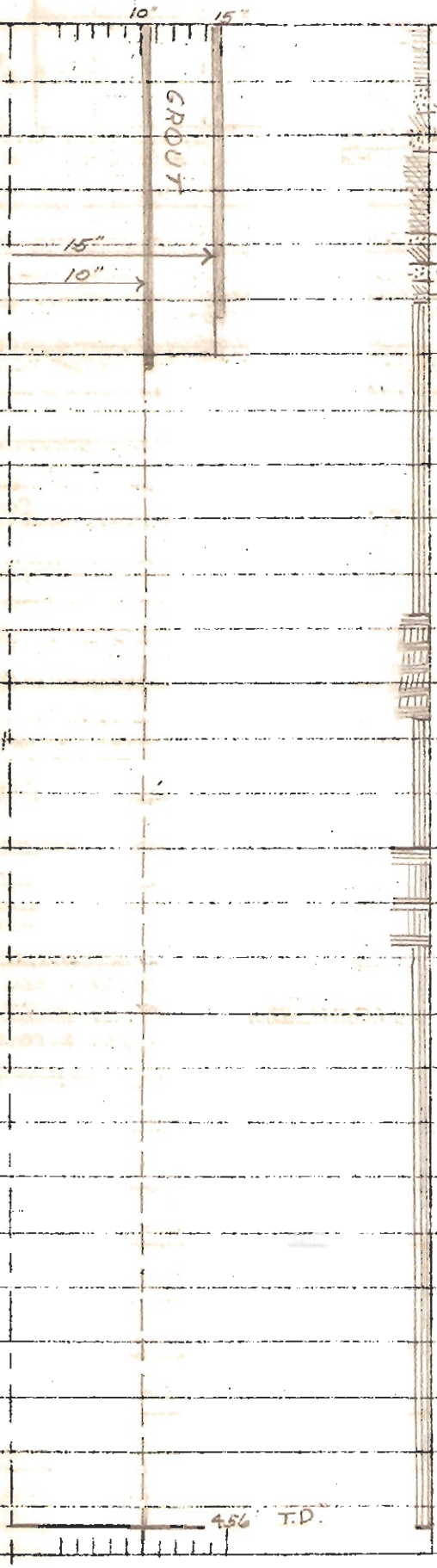
Original depth to water ft. above / below Date

Original elevation of water level ft.; Source of data

Sources of water: Principal Silurian; Others

CASING DIAGRAM

Vertical scale 1" = 50'



LOG

Clay 0-20'
Sand 20-28'
Sand & blue clay 28'-40'
Blue clay 40'-63'
Sand & Blue clay 63'-73'
Sand 73'-78'
Clay 78'-83'
Slate 83'-86'

Limestone 86'-180'

Limestone & Shale 180'-210'

Limestone 210'-250'

Limestone & Shale 250'-280'

Limestone 280'-456'

Production data: Date Feb. 25, 1939

Static depth to water 85' Measuring point surface

Pumping level 136' at 69 g.p.m.

131' 63

Specific capacity ____ g.p.m. per ft. drawdown; Temperature 51½ °F.

Pump data; Type pump Cylinder Column Dia. 6" Length ____

Cylinder or bowls: Dia. ____ Length ____ Suction pipe ____

Power D Airline ____

Estimated rate of production: 60 g.p.m. for 24 hrs. a day

Use of water public supply

WATER ANALYSES (in parts per million)

Date sampled	Feb 25 1939	Dec. 1940	Dec. 1940	
Sampled by	H.R. Green	Hershey	Hershey	
Total solids	422	532	435	
Insoluble matter	12.8	9.0	4.0	
Alkalinity (Meo)	414.0	370.0	376.0	
Alkalinity (Phn)	0.0	0.0	0.0	
pH	6.9	7.0	7.0	
Fe_2O_3+ Mn_2O_3+Al_2O_3	4.0	2.0	1.0	
Alkali as sodium	66.7	54.5	51.8	
Calcium	72.0	82.9	23.6	
Magnesium	23.7	33.0	22.7	
Iron (unfiltered)	0.1	1.1	0.1*	
Manganese	0.00	0.00	0.00	
Nitrate	0.00	0.00	0.00	
Fluoride	1.00	Tr	Tr.	
Chloride	3.00	7.0	6.0	
Sulfate	21.4	102.9	31.3	
Bicarbonate	505.1	451.4	458.7	
Hardness (ppm)	277	345	277	
Hardness (gpg)	16.2	20.1	16.2	

Remarks * Fe may be low. Sample decanted.

Laboratory data: Sample storage location A E 4

Sample range 0-456 No. spls. ____ No. dupls. & cond. ____

Spls. prepared by ____ Washed range ____ by ____

Driller's log and cond. Yes excellent

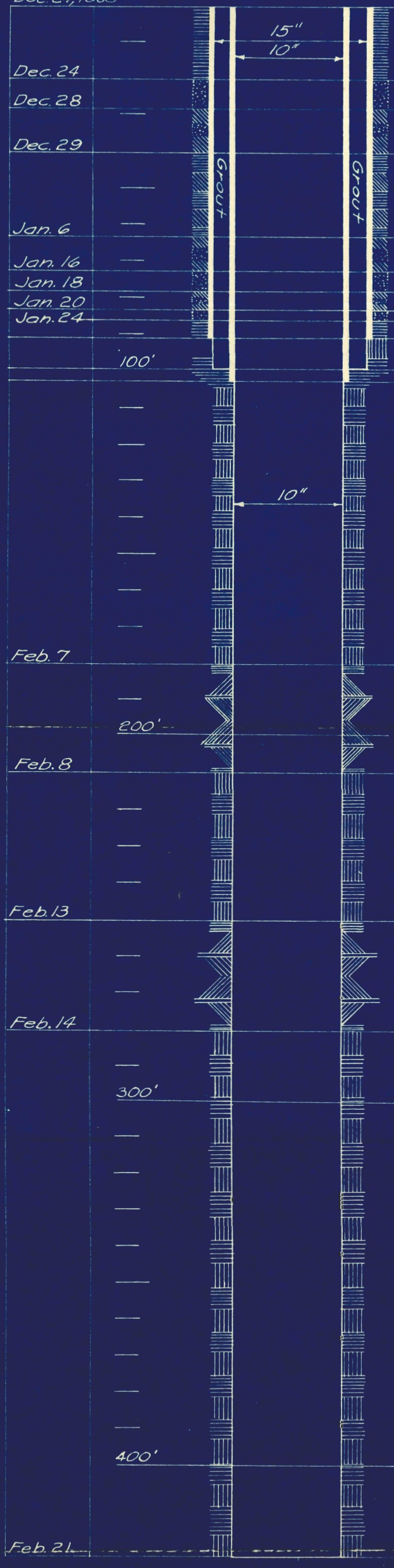
Insoluble residues: Prepared by ____ Studied by ____ Strip log ____

Microscopic study 0-456 strip log Gardner 1939; Milton & Hawkins 1942

Gen. log ____ Correl. by Gardner

Dec. 24, 1938

0 = Sea Level +



	Depth Below Surface	
Dec. 24	20'	Clay
Dec. 28	28'	Sand
Dec. 29	40'	Sand & Blue Clay
Jan. 6	63'	Blue Clay
Jan. 16	73'	Sand & Blue Clay
Jan. 18	78'	Sand
Jan. 20	83'	Sand & Clay
Jan. 24	86'	Sand
	100'	
	103'	
Feb. 7	180'	Lime Stone
Feb. 8	210'	Lime Stone & Shale
Feb. 13	250'	Lime Stone
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Feb. 21	456'	Lime Stone

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ATKINS IOWA
PROJECT DOCKET IA. 1694-F

HOWARD R. GREEN CO. ENGINEERS

CEDAR RAPIDS IOWA

1938-1939

	Day Set	Day After
Static Level	2/2/39	9.0
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At 3:37 p.m. after a 15 minute run at 71.0 g.p.m. the draw down was 44.5 ft. for a specific capacity of 1.60.

At 4:00 p.m. after a 15 minute run at 80 g.p.m. the draw down was 53 ft. for a specific capacity of 1.51.

It was therefore determined to run the twenty-four hour test at or about a uniform rate of sixty (60) g.p.m. This test was started at 11:30 p.m., February 24, and continued until 11:30 p.m. February 25. The number of strokes per minute was kept as uniform as possible. The pump was calibrated two additional times during the run to check any slippage in the cylinder. The draw down was noted at least once each hour. A table of hourly results is as follows:

Time	Draw Down	Rate of Pumping	Specific Capacity
February 25			
12:30 a.m.	41	60	1.46
1:30 a.m.	43	61	1.42
2:30 a.m.	45	62	1.38
3:30 a.m.	46	62	1.35
4:30 a.m.	47	62	1.32
5:30 a.m.	47	63	1.34
6:30 a.m.	46	63	1.37
7:30 a.m.	47	64	1.36
8:30 a.m.	48	65	1.36
9:30 a.m.	48	65	1.36
10:30 a.m.	47	64	1.36
11:30 a.m.	51	69	1.35
12:30 p.m.	51	69	1.35

Time	Draw Down	Rate of Pumping	Specific Capacity
February 25			
1:30 p.m.	47	64	1.35
2:30 p.m.	47	64	1.36
3:30 p.m.	46	63	1.37
4:30 p.m.	46	63	1.37
5:30 p.m.	46	63	1.37
6:30 p.m.	47	64	1.36
7:30 p.m.	46	63	1.37
8:30 p.m.	46	63	1.37
9:30 p.m.	46	63	1.37
10:30 p.m.	46	63	1.37
11:30 p.m.	46	63	1.37

Recovery Test

Upon completion of the twenty-four hour pumping test the recovery of the static water level was noted by gage readings at five minute intervals until the original static water level was noted at five minute intervals. The rate of recovery was very satisfactory being 74% in the first five minutes. The table of results follows:

Time	Draw Down	Percent Recovery
11:30 p.m.	46	--
11:35 p.m.	12	74%
11:40 p.m.	9	81%
11:45 p.m.	7	85%
11:50 p.m.	5	89%
11:55 p.m.	4	91%
12:00	4	91%
12:05 a.m.	4	91%
12:10 a.m.	3	94%
12:15 a.m.	3	94%
12:20 a.m.	3	94%
12:25 a.m.	2	96%
12:30 a.m.	1	98%
12:35 a.m.	1	98%
12:40 a.m.	-	100%

Attached hereto is a copy of the chemical and mineral analysis report made on a one gallon sample taken at the end of the twenty-four hour test and made by the State Hygienic Laboratory at Iowa City.

Respectfully submitted,

HOWARD R. GREEN COMPANY, ENGINEERS

By H R Green

HRG:V

HOWARD R. GREEN CO.
Consulting Engineers
208-209-210 BEVER BUILDING, CEDAR RAPIDS, IOWA

WATER SUPPLY AND TREATMENT
SEWERS AND SEWAGE DISPOSAL
STRUCTURES, BRIDGES, BUILDINGS
UTILITY VALUATIONS, RATES
INVESTIGATIONS, REPORTS

February 13, 1940

Dr. H. G. Hershey
Iowa Geological Survey
Iowa City, Iowa

Subj: Atkins, Iowa, Well

Dear Dr. Hershey:

I was at Atkins yesterday. You may remember my telling you that the Fairbanks, Morse & Co. pump which was installed in the municipal well did not come up to guaranteed efficiencies. At the present time they are placing a new unit in the well. The discharge column which has been removed from the well shows considerable corrosion above the static water line. The pump is only operated about an hour and a half a day so the static water line is maintained perhaps 90% of the time. On the exterior of the discharge column below water line is a coal black greasy deposit. The same conditions were noted on the exterior of the shaft tubing. In the turbine pump itself (cast iron case and bronze impellers) there appears to be some softening action in the cast iron contact surfaces.

I wish you would look at your copy of the mineral water analysis of March 3, 1939, under Your No. 130684, and see if you can throw any light on the situation. I note that no CO_2 determination was made but the pH is shown at 6.9 and the sulfate radical at 13.2. The water has a distinct sulphurous odor and it is noticeable to taste and smell at consumers' taps. I think possibly we can check the corrosive action within the pump itself by introducing a small quantity of milk of lime every time the pump is thrown out of operation. My suspicion is that the corrosion above water line is caused by released gases and I do not know whether creating a circulation of air above water line would be worth while or not. I think it is going to be necessary to aerate the water before discharging into the system to remove the objectionable taste and odor, but I would like to get your reaction to the progressive corrosion which seems to be taking place in view of the available analysis.

Yours very truly,

HOWARD R. GREEN COMPANY

By H R Green

HRG:V

Talked this over with Mr Green on Feb 16 in his office suggested pantry outside line at end of pump house above water line and introduction of alkaline solution into inside of pump line at end of each pumping period 7 PM

HOWARD R. GREEN CO
CONSULTING ENGINEERS
208-210 BEVER BLDG.
CEDAR RAPIDS, IOWA

February 8, 1941

Mr. H. A. Haerther, Mayor
Atkins, Iowa

Dear Mr. Haerther:

The day before yesterday I received from Dr. Hershey of the State Geological Survey a further report on the Atkins water. I think it would be well to review in a preliminary way what the situation is. To say the least, it is puzzling and before we make any definite recommendations to you I want to get some prices on equipment and to study into the rather mysterious situation further.

You will remember that we had samples of the well water which had stood in the discharge column of the pump over night analyzed as well as water taken from the pump after fifteen minutes of operation. We did this for two purposes. We wanted to compare the analysis of the water itself and also to get an analysis of the sludge which was discoloring the first water pumped.

Our theory is that, due to the fact that the first water pumped is discolored and clears up afterwards, the water is perhaps attacking the metal work of the pump and discharge pipe during a period of ten or twelve hours retention in the pipe. If this is true I cannot see why the water pumped out in the mains may not be having the same effect on the iron pipe of the distribution system.

You will remember that we had an analysis made February 25, 1939, that is, about two years ago when the well was first operated, and there have apparently been some changes in the quality of water secured from the well. The total solids have increased from 415 to 532. The alkalinity has decreased from 414 to 370. The alkalies as sodium have decreased from 65.6 to 54.5. Calcium has increased from 71.5 to 82.9. The pH or acidity of the water which stood at a pH of 6.9 has been eliminated and the pH is now at the neutral point of 7.0. The iron has greatly increased from

0.3 to 1.1. The Fluorine has decreased from 1.0 to a trace. The chlorine has increased from 3.0 to 7.0. The sulfate (SO_4) has increased from 13.2 to 102.9. The bicarbonate has decreased from 505 to 451. The hardness has increased from 283 to 345 or from 16.5 grains per gallon to 20.1 grains per gallon. All of the foregoing numerals apply to parts per million.

After the pump has been in operation for fifteen minutes or more the water is clear but the water which has been retained in the discharge column over night is cloudy. Water siphoned off the top of the sample jug after standing shows total solids of 435 which is only slightly greater than the sample taken two years ago. The water is still neutral as to acidity, the pH standing at 7.0, the calcium and magnesium are reduced. The iron has practically disappeared. The sulfate has dropped from 102 to 31 parts per million and the hardness has decreased from 20.1 grains to 16.2 grains.

In a preliminary way I would say that it will be necessary to remove the dissolved gases from the water and to aerate it and to follow that treatment by filtration. We will, therefore, try to get some equipment prices immediately and make a definite recommendation and report to you at the earliest possible date. In the meantime if any of you should be in Cedar Rapids I will be glad to discuss the matter with you further. However, if you prefer that I come out for a meeting of the council, I will be glad to do so although I would rather wait until we have a little more definite opinion.

Yours very truly,

HOWARD R. GREEN COMPANY

By H. R. Green

HRG:V
cc Dr. H. G. Hershey
The Dorr Company

P.S. I forgot to state that Dr. Hershey's examination of the sludge which settled out of the water was that it was 40% calcite (pure limestone) and 60% limonite (iron oxide). The calcite was in crystal form and its presence is hard to explain.