WJ4-9 0-455
WJ4-10 455-952

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

W-1544

RECORD OF WELL

Location:

Town: Readlyn (N E S W); County Bremer

SE NW SE sec. 11 T. 91 N., R. 12 W. Mayfield Twp.

Well name and number Readlyn town well

Owner town of Readlyn Address

Tenant Address

Contractor Thorpe Bros Well Co. Address Des Moines

Drillers Cecil Allen

Drilling dates April 15, 1942 to June 13, 1942

Well data: DEEPENED FROM 808'-868' IN 1959 BY HOLT & AMES

Elevations: Drilling curb 1039 feet; Land surface 1039 feet

Determined by KEA

Topographic position

Total depth: Reported 952 feet, Measured feet

Drilling method cable tool

Hole and casing data 150 ft of 10" casing 0-150 ft;
(Give amount, size, kind, and depth of all casing; type and
280' 10" of 8" casing 134 to 420' 10"; 159' of 6" casing
position of seals and packers; cementing; how finished--perforated pipe, screen,
649 to 808 ft perf in lower 95'
gravel pack, open hole, etc.)

Original depth to water 34.1 ft. above below Date

Original elevation of water level 1004.9 ft.; Source of data McAllister

Sources of water: Principal Galena & St. Peter ; Others

Production data: Date June 15, 1942

Static depth to water 34.1 Measuring point

Pumping level 77 at 130 g.p.m.

Specific capacity 3.0 g.p.m. per ft. drawdown; Temperature 49 °F.

Pump data; Type pump Column Dia. Length

Cylinder or bowls: Dia. Length Suction pipe

Power Airline

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

Use of water

WATER ANALYSES (in parts per million)

Date sampled	June 15, 1942			
Sampled by	D.A. Davis			
Total solids	416			
Insoluble matter	7.0			
Alkalinity (Meo)	326.0			
Alkalinity (Phn)	0.0			
pH	7.4			
Fe_2O_3+ Mn_2O_3+Al_2O_3	19.5			
Alkali as sodium	33.0			
Calcium	76.5			
Magnesium	15.1			
Iron (unfiltered)	0.7			
Manganese	0.0			
Nitrate	0.44			
Fluoride	0.5			
Chloride	1.0			
Sulfate	7.1			
Bicarbonate	397.7			
Hardness (ppm)	254.4			
Hardness (gpg)	14.9			

Remarks

Laboratory data: Sample storage location

Sample range 0-808 No. spls. 174 No. dupls. & cond. 174 good

Spls. prepared by Hawkins Carrier Washed range by

Driller's log and cond.

Insoluble residues: Prepared by Studied by Strip log ✓

Microscopic study J.B.C strip log

Gen. log ✓ Correl. by Carrier

WATER LEVEL DATA

Measuring point _____

Date	Depth to water	Altitude	Remarks

REMARKS

at 601 ft pumping test produced 125 gpm. with a 50 ft dd from a static level of 30 to 32 ft.

Original depth = 808'

Deepened from 808 to 868 (1952)

Deepened from 868 to 952 (1960) by Hoeg & Ames and abandoned.

1544

MASTER CARD-A

9-26-69
RP 11-22-70

STATE	COUNTY	LATITUDE DEG	LATITUDE MIN	LATITUDE SEC	LATITUDE N or S	LONGITUDE DEG	LONGITUDE MIN	LONGITUDE SEC	NO SEQ.
1 2	3 4	5 6	7 8	9 10	11	12 13 14	15 16	17 18	19
19	09	42	42	18	N	092	13	23	1

WELL SCHEDULE

US GEOLOGICAL SURVEY

IOWA DISTRICT WRD

WELL NO 1544 CO BREMER

OWNER CITY WELL ADDRESS READLYN

DRILLER THORPE DATE DRLD 6-1942

MAP

SOURCE OF DATA FILE

DESCRIPTION M.P LSD FEET (ABOVE) (BELOW) LSD

CONTINUED FROM ABOVE	ACCURACY	LOCAL WELL NUMBER T	R	E/W	SEC.	QUARTERS	LOCAL USE W-NUMBER	OPTIONAL	OWNER OR NAME	OWNERSHIP	WATER USE	WELL USE	WELL DATA	FREQ W/L	FIELD CHAR	HYD LAB	QW-DATA	QW-FREQ.	PUMPAGE	APERTURE	LOG DATA	CARD DESIG
	20	21 22 23	24 25	26	27 28	29 30 31 32 33 34	35 36 37 38 39	40 41 42 43 44 45 46 47 48 49 50 51	52 53 54 55 56 57 58 59 60 61 62 63 64 65 66	67	68	69	70	71	72	73	74	75	76	77	78 79	80
	2	09 1	12	W	11	DBD	01544	/1 42 CITY	READLYN	M	P	W	1	Ø							G	A

WELL-DESCRIPTION CARD-B

DUPLICATE CARD A CC 1-19	DEPTH OF WELL	ACCURACY	DEPTH CASED OR FIRST PERF.	DIAM. INCHES	WELL FINISH METH. DRILLED	YEAR DRILLED	PUMP SETTING	METH. LIFT	DEEP/SHALLOW	POWER	ALTITUDE OF LSD (FEET)	ACCURACY	WATER LEVEL (FEET)	ACCURACY	DATE MONTH	DATE YEAR	YIELD OF WELL (GPM)	METH. DET	DRAW-DOWN (FEET)	ACCURACY	PUMPING PERIOD (HOURS)	QUALITY OF WATER IRON	SULF.	CHLOR	HARD	SP. COND.	TEMP	DATE SAMPLED	CARD DESIG.
	20 21 22 23	24	25 26 27 28	29 30	31	32	33 34 35	36 37 38	39	40	41 42 43 44 45 46	47	48 49 50 51	52	53 54	55	56 57 58 59 60	61	62 63 64	65	66 67 68	69	70	71	72	73	74 75 76	77 78 79	80
	952	3	808	10	X	C	92				1037	7	34	D	64	2	130	3	43	3									B

HYDROGEOLOGIC CARD-C

DUPLICATE CARD A CC 1-19	PHYS-IOG-RAPHY PROV.	PHYS-IOG-RAPHY SEC.	DRAINAGE BASIN	SUBBASIN	GEO-LOGIC SETTING	MAJOR AQUIFER SYSTEM	SERIES USGS	SERIES ISB	UNIT	LITH-OLOGY	ORIG.	THICK-NESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	MINOR AQUIFER SYSTEM	SERIES USGS	SERIES ISB	UNIT	LITH-OLOGY	ORIG.	THICK-NESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	DEPTH TO CONSOL-DATED ROCK	SOURCE	DEPTH TO BASEMENT	SOURCE	SURF MAT. LITH-OLOGY	SURF MAT. INFIL	COEF TRAN SIG FIG	COEF TRAN XIO	COEF STOR SIG FIG	COEF STOR XIO-	PROD. CARD	CARD DESIG.
	20 21	22	23 24 25	26	27	28	29	30	31	32 33	34	35 36 37	38 39 40	41 42 43	44	45	46	47	48 49	50	51 52 53	54 55 56	57 58 59	60 61 62 63	64	65 66 67 68	69	70 71	72	73 74	75	76 77	78	79	80
	12	E	26	A		Ø	1	L	P	80	6		144	797										80	D			P	4						C

CASING AND SCREEN (SIZE, TYPE, INTERVALS):

Well deepened by Hoeg & Imes from 808-868 (1959)
" " Jan. 1960 to 952' by Hoeg & Imes

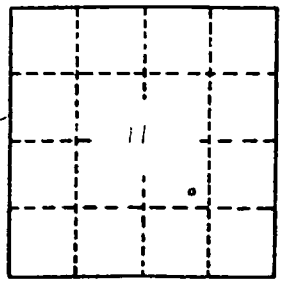
150' of 10" from 0-150'
286' 10" of 8" from 134'-420'
159' of 6" from 649'-808'

CODED BY MACGOWAN (KH) DATE 8-15-72

PUNCHED BY Yelund DATE 8-17-72

VERIFIED BY DATE

SKETCH ON REVERSE: YES NO



WELL NO 1544

Boyd: Irwin's log
of 170' well sent to Thorpe
Top Soil: 0-2
Yellow Clay: 2-65
Br. lime 65-134
Red Shale 134-170
17'-2" of 18"
94'-1" of 12" 2 yds - 25 sacks of
Cement dumped in
SWL at 130' was 30'
" -150 " 25'
" -170 " 42'
360 gpm = D.P. = 4'
Completed: 9/15/52 SP cap
= 90 gal/ft

April 2, 1942

The Mayor and City Council
Readlyn, Iowa

Gentlemen:

Following is a report on the geology and ground water possibilities at Readlyn, based on records in the files of the Iowa Geological Survey and on a special survey made by Mr. K. E. Anderson of this department on April 1-2, 1942, in cooperation with Mr. R. B. McAllister of the State Department of Health.

The rock formations to be expected in drilling a well at Readlyn are summarized on the following page. The depths given are based on a starting elevation of 1038 feet which is the approximate elevation of the ground at the present standpipe.

Geologic conditions are slightly abnormal at Readlyn and for this reason it may be necessary to adjust some of the depth figures as drilling progresses. In order to do this it will be necessary for us to examine the rock cuttings which can be obtained during drilling operations. These cuttings will have other value in the ultimate success of the well and I suggest that a clause be included in your specification directing the driller to save a sample of them from each five-foot interval drilled and of each formation less than five feet thick.

Since your present 108-foot well has shown bacteriological contamination and since other wells in town to approximately the same depth are also probably contaminated; the construction and casing of the new well should be carefully planned and executed.

It has already been suggested that a 14-inch hole be drilled through the glacial drift and the upper portion of the Silurian dolomite bedrock to an horizon below the present contaminated zone, then center 10-inch casing in the 14-inch hole and place cement in the annular space outside the casing and continue drilling a 10-inch hole. Although this may appear to be somewhat expensive it will considerably lengthen the life of the casing and insure against contamination through the interval cased.

The depth to which the casing should be carried can best be determined during drilling operations and after the samples have been studied. It will undoubtedly be greater than 100 feet and may be considerably more than that.

Forecast of Formations

to be Expected in Drilling at Readlyn, Bremer County

	Thick.	From	To
PLEISTOCENE SYSTEM			
Drift - sandy and gravelly clay possibly with sand and gravel lenses	80±'	0	80±'
SILURIAN SYSTEM			
Dolomite, cracked, creviced, leached and weathered at top	90'	80±'	~~170'~~ 151
ORDOVICIAN SYSTEM			
Maquoketa formation			
Brainard member - shale, gray to green, limy layers	120'	~~170'~~ 151	~~290'~~ 271
Ft. Atkinson member - cherty limestone and dolomite	50'	~~290'~~ 271	~~340'~~ 321
Clermont member - gray to green shale, limy in part	40'	~~340'~~ 321	~~380'~~ 361
Elgin member - limestone and dolomite, shale or shaly in lower part	40'	~~380'~~ 361	~~420'~~ 401
Galena-Platteville			
Limestone, cherty in part, in upper 270 feet; limestone and shale beds in lower 50 feet	320'	~~420'~~ 401	~~740'~~ 721
St. Peter sandstone	45'	~~740'~~ 721	~~785'~~ 766

Because of other contaminated wells in town which terminate in the Silurian dolomite it is impossible to give absolute assurance that a well constructed as outlined in the foregoing paragraphs will yield bacteriologically pure water and it may be necessary to case out the entire Silurian. The dolomite is often cracked or creviced throughout its entire thickness. One of these cracks or crevices may run downward at an angle from a contaminated well to the lower portion of the dolomite and carry unsafe water to the site of your new well. The chances of the existence of such a condition are not great but it should not be overlooked as a possibility.

I suggest that when a depth of 100 feet is reached the samples be sent to us for study and that thereafter until the casing point is reached the samples be sent in at the end of each day of drilling. After the samples reach us and have been studied we will report to you immediately.

The ultimate source of the water supply will depend somewhat on the depth to which it is necessary to case. If the casing point is not too deep and the depth to the top of the Maquoketa shale is approximately 170 feet, sufficient water for the town supply should be found in the Silurian dolomite above 170 feet, although the lower portion of the Silurian may be relatively dry. If, on the other hand, the casing has to be carried deep into or through the Silurian for reasons already outlined, it will be necessary to drill the well below the Silurian in order to obtain an adequate supply.

If the deeper drilling is necessary it may be possible to get enough water to satisfy the requirements from limestones in the Maquoketa formation, but in all probability it will be necessary to drill into the Galena limestones for as much water as 50 gallons per minute. Normally the Galena is dry at the top, but it should yield 50 g.p.m. within 75-100 feet of the base of the Maquoketa, in other words at an approximate depth of 495-520 feet below the surface. It may be necessary to acidise the Galena to increase the yield. For this reason the driller should be requested to report the depth to any waters encountered and any changes in water level.

If the well is carried through the Maquoketa it will be advisable to case the entire formation; perforating, if necessary, opposite any suitable water-bearing strata. By using 10-inch casing in the upper portion of the hole, 8-inch casing can be used through the Maquoketa and an 8-inch hole drilled into the Galena limestone.

According to analyses which we have available for the area around Readlyn, the mineralogical quality of water from the Galena is not greatly different from that which you are now using. We have no reliable information on the quality of possible waters in the Maquoketa limestones in the Readlyn area.

If you have any questions regarding this report or if the Iowa Geological Survey can furnish additional information please feel free to call on us.

I will appreciate it if you will let us know to whom the contract is awarded and when drilling is to start. We will be glad to assist in any way possible during the drilling and testing.

Very truly yours,

H. G. Hershey

HGH:N

K. O. Becker, City Clerk (The Mayor + City Council)

cc to Mr. R. B. McAllister, Decorah, Iowa
Mr. A. H. Wieters, Des Moines, Iowa

February 8, 1960

TO: H. G. Hershey
FROM: C. N. Brown
RE: Readlyn Muni. Water Supply
DATE: February 2, 1960

I met with Readlyn City Council night of 2-1-60 and discussed their problem. Their deep hole is lost and they have two choices. Perforate deep well in the Silurian, or drill a new hole to max. dept. 161'. I advised a new well because it will probably be cheaper

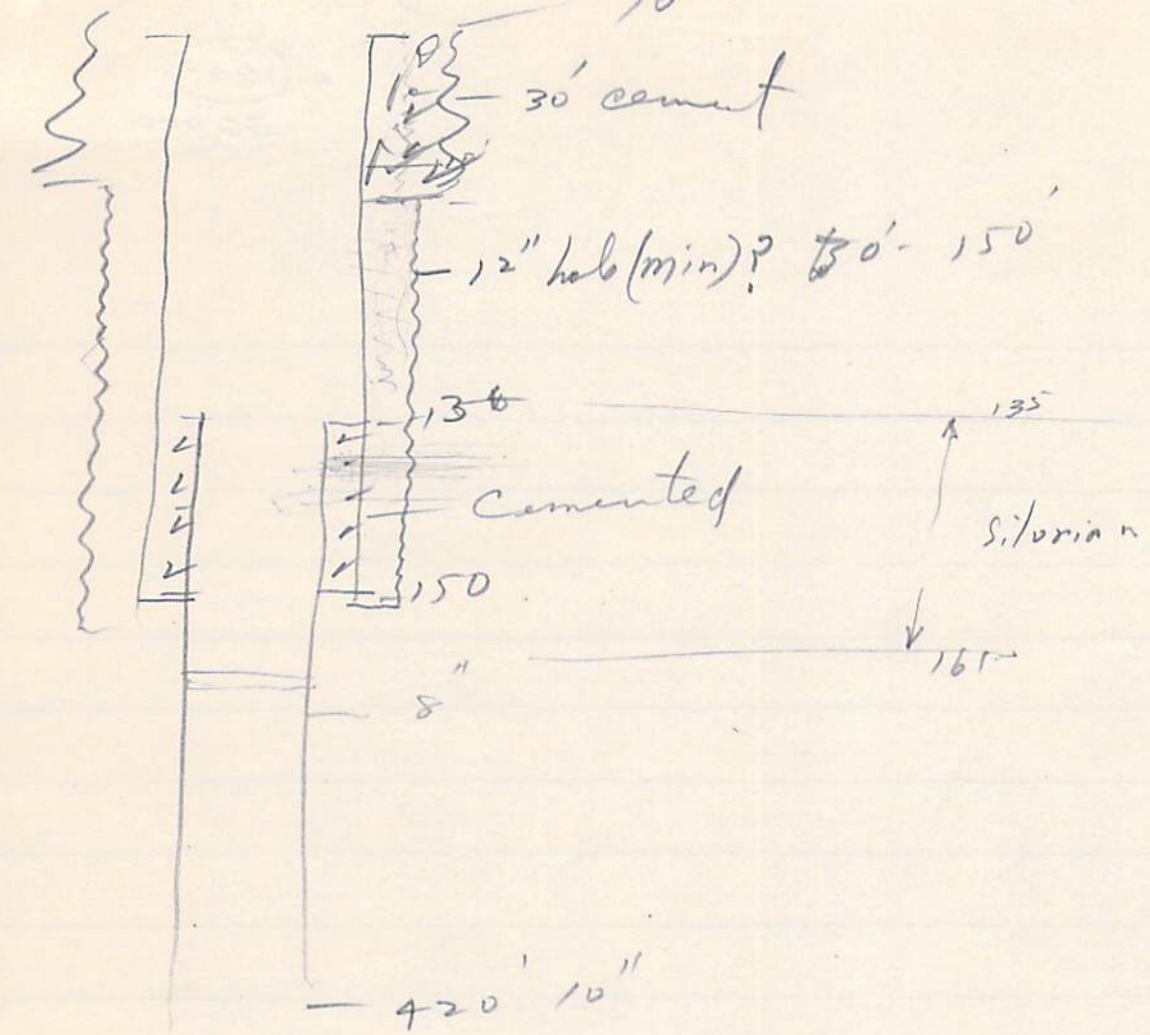
Their deep well was lost Thurs. Hoeg and Ames were hired to recondition pump and clean well. Well was clean, pump good -- well only good for 50 g.p.m. They then told Hoeg & Ames to drill to the Jordan. After drilling 60' they broke a bit. While trying to jar the bit loose they broke the jars, while trying to drill around they broke second bit ---- and quit.

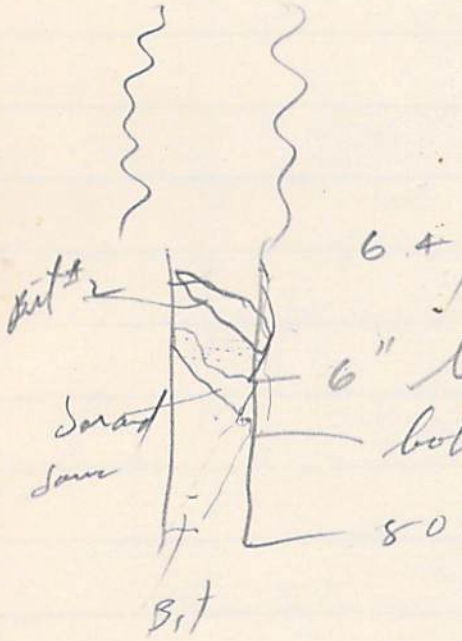
See attached log and drawing.

Readily Deep Well

4/60
CAB

2





These bits have become completely, irrevocably stuck - the bottom part of the hole is lost.

IOWA GEOLOGICAL SURVEY
Generalized Log Based on Detailed
Description of Drill Cuttings

Name of Well Rawlyn City Well Survey No. W-1544

Location SE¼ SW¼ SE¼ sec. 11, T. 91 N., R. 12 W. (Grover County)

Drilled by Thorpe Bros. Well Co.

Total Depth 838 ft. Curb Elevation 1039 ft. Static Level 34.1 ft.

Pumping Test 5 Hours 4 Min; Gal. per min. 120 Drawdown 25.9 ft. in min.

Casing Data 150' of 10" from 0 to 150'; 286' 10" of 6" from 134' to 420'10"; 150' of 6" from 649' to 838' perforated in lower 95'

Description of Formations

No.	Rock Unit	Thick.	From (feet)	To
	PLEISTOCENE SYSTEM			
1.	Clay, light yellow and gray mottled, noncalcareous, very silty with glacial sand and gravel of quartz and igneous rock embedded	15	0	15
2.	Clay, light yellowish brown, calcareous, silty with abundant glacial sand, gravel and pebbles	20	15	35
3.	Clay, light yellow and medium brownish gray mottled, calcareous, silty, sandy	10	35	45
4.	Clay, medium yellowish brown, calcareous, silty, with 20% to 25% glacial sand and gravel included	30	45	75
5.	Sand, major grade 2 to 1 mm., minor amounts of granules and pebbles, angular, polished, mostly quartz with some granite and limestone, silty	5	75	80
	SILURIAN SYSTEM (Undifferentiated)			
6.	Dolomite, light yellow and drab, medium-grained, dense, granular, with 15% chert, white, dull, granular to light gray, vitreous, chalcedonic, quartzose	10	80	90

Notes:

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
7.		Dolomite, very light yellowish gray, fine-grained, granular to medium-grained saccharoidal with 30% to 45% limestone, light orange brown, iron stained, sublithographic, and 5% to 15% chert as in 80 to 90 feet	15	90	105
8.		Dolomite, very light yellowish drab and brown, iron stained in part, fine- to medium-grained, dense, granular, subtranslucent, with trace chert as in 80 to 90 feet. Trace yellowish brown residual clay fissure filling 110 to 115 feet	30	105	135
9.	No sample		4	135	139
10.		Dolomite, very light gray to yellowish buff, iron stained in part, fine- to medium-grained, dense to saccharoidal, porous, with trace to 5% chert as in 80 to 90 feet, iron stained	20	139	161
	ORDOVICIAN SYSTEM Neda (?) formation				
11.		Shale, light maroon stained yellow and green, very calcareous, massive, soft, with trace to 15% limestone, light gray stained yellowish brown, fine- to coarse-grained, soft, argillaceous. (Note - driller's log gives top of shale, hence Neda (?), at 151 feet)	14	161	175
12.		Limestone, pale to light yellow and gray, coarse-grained, dense, slightly argillaceous, with 30% shale, light greenish gray, very calcareous, slightly silty, soft	5	175	180
13.		Shale, light bright green to yellowish green, mottled dark red and brown, calcareous, slightly silty with trace to 10% limestone as in 175 to 180 feet. Hematite concretions	20	180	200
	Maquoketa formation Brainerd member				
14.		Shale, light medium greenish gray streaked maroon and yellowish brown, in part massive, soft, dolomitic with few traces of argillaceous dolomite and limestone	30	200	230
15.		Shale 60%, as in 200-230 feet, with 20% to 25% dolomite, light gray, fine- to medium-grained, granular, dense, silty and argillaceous. Chert 15% to 20%, light gray, few embedded black specks and dolomite rhombs, dull, subconchoidal	10	230	240
16.		Shale, varicolored, calcareous, soft, structureless with trace to 10% dolomite and limestone, light medium gray, fine-grained, argillaceous	25	240	265
17.	No sample		10	265	275

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
18.		Shale, light medium greenish gray, very calcareous, soft, massive with 15% limestone, light medium gray, fine-grained, granular, slightly argillaceous. Chert or siliceous siltstone, trace to 5%, light gray, dull, granular, opaque	40	275	315
	Ft. Atkinson member				
19.		Limestone, light drabish gray, fine-grained, with abundant dark gray, coarsely crystalline fossil fragments embedded. Shale 20% to 40%, as in 275 to 315 feet	10	315	325
20.		Limestone, light grey and creamy drab, fine-grained, dense very argillaceous, few coarsely crystalline fossil fragments embedded, with 5% to 10% chert or silicified siltstone, light buffish-gray, few black specks, dull, granular, subconchoidal, opaque	15	325	340
21.		Limestone, light buff, fine- to medium-grained with few dark gray and brown coarsely crystalline fossil fragments embedded. Chert 30% at top grading downward to 10%, light buff and drab mottled, few black specks, subvitreous to dull, conchoidal to granular	30	340	370
	Clermont member				
22.		Shale, light medium greenish and bluish gray, very calcareous, massive, with 35% limestone 370-375 feet, light medium drab to gray mottled black, fine-grained, granular, argillaceous	20	370	390
	Elgin member				
23.		Limestone, light to light medium drab, gray, and buff mottled, fine-grained with coarsely crystalline fossil fragments embedded. Dolomite 10% to 40%, medium to dark brown and gray, fine- to medium-grained, silty, argillaceous, with few thin partings light bluish gray, noncalcareous, nonfissile clay	30	390	420
24.		Limestone, medium to dark brownish gray, fine-grained, slightly argillaceous. Dolomite trace as in 390 to 420 feet	5	420	425
25.		Dolomite 50% to 70%, medium drabish gray fine-grained, dense, granular, argillaceous, calcareous. Limestone 30% to 50%, light to medium drabish gray, fine-grained, very slightly argillaceous and dolomitic	15	425	440
	Galena formation				
26.		Limestone, light buff and drab, orange brown specks embedded, fine- to coarse-grained with very abundant coarsely crystalline crinoid stem fragments embedded	35	440	475

Survey No. S-1544

No.	Rock Unit	Description	Thick	From	To
27.		Limestone, light buff, fine-grained, with fossil fragments as in 440-475 feet, dolomitic, grading into 10% dolomite, light drab, medium-grained, granular, slightly calcareous	30	475	505
28.		Limestone, very light buffish drab, fine-grained, granular, dense, with fossil fragments as in 440-475 feet, dolomitic grading into 15% dolomite, light tawny brown, fine medium-grained. No sample 510 to 515 feet	20	505	525
29.		Limestone, as in 505 to 525 feet, with dolomite 25% to 50% at base, light tawny drab and brown, fine medium-grained, translucent, granular. Chert 5% to 10%, light gray, dull, granular, to vitreous, conchoidal, with embedded sponge spicules 550 to 555 feet	30	525	555
30.		Limestone, very light buff mottled dark gray by fossils, very fine-grained, dense, fossil fragments and light brown dolomite rhombs embedded. Chert 10% as in 550 to 555 feet	5	555	560
31.		Dolomite, light drab, fine- to medium-grained, dense, calcareous with 25% limestone, light buff, fine-grained, embedded dolomite rhombs and fossil fragments. Chert 15%, as in 550 to 555 feet	5	560	565
32.		Limestone, light buff and drab, mottled by dark gray fossil fragments, fine-grained, abundant dolomite rhombs, light tawny brown, fine medium-grained	35	565	600
33.		Limestone, light buff to grayish drab, heavily mottled black, fine- to medium-grained, with coarsely crystalline crinoid and brachiopod fragments and dolomite rhombs embedded. Chert trace to 10%, light drab speckled black, subvitreous, conchoidal, opaque	30	600	630
34.		Limestone, very light buff, slightly mottled dark gray, very fine-grained, granular, soft, with fossil fragments embedded as in 600 to 630 feet. Chert trace to 5%, as in 600 to 630 feet	30	630	660
	Deseroh formation Ion member				
35.		Limestone, light medium greenish gray with very abundant dark gray fossil fragments embedded, argillaceous with 15% limestone as in 630 to 660 feet	5	660	665
36.		Shale, light medium green, very calcareous, waxy, glistening, flaky, with 20% to 30% limestone, as in 660 to 665 feet, with abundant bryozoa and brachiopod fragments embedded	10	665	675

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
		Guttenberg member			
37.		Limestone, very light to light drab, mottled heavily by dark gray fossil fragments and speckled reddish brown in part, fine-grained with coarsely crystalline fragments of crinoids, brachiopods, and ostracodes embedded, dolomitic in part	15	675	690
		Platteville formation Spechts Ferry member			
38.		Shale, light green, calcareous, dull, faintly laminated, massive, soft	5	690	695
		Platteville (undifferentiated)			
39.		Limestone, light to light medium drabish gray and buff, mottled medium to dark gray by fossils, very fine-grained dense; trace brown, argillaceous limestone. Shale trace to 10%, light green, pyritic, noncalcareous, splintery	35	695	730
40.		Limestone, as in 695 to 730 feet with much dark gray fossil mottling. Shale trace, light bluish gray, noncalcareous, flaky, soft; phosphate nodules, trace 735 to 740 feet	10	730	740
		Glenwood member			
41.		Shale, light medium grayish green, very slightly calcareous, structureless, soft, with traces of limestone and phosphate nodules as in 730 to 740 feet	10	740	750
		St. Peter formation			
42.		Sand, white, major grade medium, subangular to curvilinear, well frosted by fine pits and grooves, trace cemented by pyrite 750 to 755 feet. (Average size grade analysis; ½-¼ mm. 65%, ¼-1/8 mm. 25%, 1/8-1/16 mm. 10%)	45	750	795
43.		No sample	2	795	797
		Prairie du Chien group Willow River formation			
44.		Sand, white, frosted, as in 750 to 795 feet (medium 40%, fine 25%) with 35% dolomite, pale to medium brownish gray and gray, fine-grained, subsaccharoidal to dense, granular, hard	11	797	808
		Total depth			808

IOWA GEOLOGICAL SURVEY
Generalized Log Based on Detailed
Description of Drill Cuttings

Name of Well Beadlyn City Well Survey No. W-1544

Location SE¼ SW¼ SW¼ sec. 11, T. 91 N., R. 12 W. (Dreser County)

Drilled by Thorpe Bros. Well Co.

Total Depth 838 ft. Curb Elevation 1039 ft. Static Level 34.2 ft.

Pumping Test 5 Hours 4 Min; Gal. per min. 130 Drawdown 25.9 ft. in min.

Casing Data 150' of 10" from 0 to 150'; 286' 10" of 8" from 134' to 420'10"; 150' of 6" from 649' to 838' perforated in lower 95'

Description of Formations

No.	Rock Unit	Thick.	From (feet)	To
	PLEISTOCENE SYSTEM			
1.	Clay, light yellow and gray mottled, noncalcareous, very silty with glacial sand and gravel of quartz and igneous rock embedded	15	0	15
2.	Clay, light yellowish brown, calcareous, silty with abundant glacial sand, gravel and pebbles	20	15	35
3.	Clay, light yellow and medium brownish gray mottled, calcareous, silty, sandy	10	35	45
4.	Clay, medium yellowish brown, calcareous, silty, with 20% to 25% glacial sand and gravel included	30	45	75
5.	Sand, major grade 2 to 1 mm., minor amounts of granules and pebbles, angular, polished, mostly quartz with some granite and limestone, silty	5	75	80
	SILURIAN SYSTEM (Undifferentiated)			
6.	Dolomite, light yellow and drab, medium-grained, dense, granular, with 15% chert, white, dull, granular to light gray, vitreous, chalcedonic, quartzose	10	80	90

Notes:

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
7.		Dolomite, very light yellowish gray, fine-grained, granular to medium-grained saccharoidal with 30% to 45% limestone, light orange brown, iron stained, sublithographic, and 5% to 15% chert as in 80 to 90 feet	15	90	105
8.		Dolomite, very light yellowish drab and brown, iron stained in part, fine- to medium-grained, dense, granular, subtranslucent, with trace chert as in 80 to 90 feet. Trace yellowish brown residual clay fissure filling 110 to 115 feet	30	105	135
9.	No sample		4	135	139
10.		Dolomite, very light gray to yellowish buff, iron stained in part, fine- to medium-grained, dense to saccharoidal, porous, with trace to 5% chert as in 80 to 90 feet, iron stained	20	139	161
	ORDOVICIAN SYSTEM Neda (?) formation				
11.		Shale, light maroon stained yellow and green, very calcareous, massive, soft, with trace to 15% limestone, light gray stained yellowish brown, fine- to coarse-grained, soft, argillaceous. (Note - driller's log gives top of shale, hence Neda (?), at 151 feet)	14	161	175
12.		Limestone, pale to light yellow and gray, coarse-grained, dense, slightly argillaceous, with 30% shale, light greenish gray, very calcareous, slightly silty, soft	5	175	180
13.		Shale, light bright green to yellowish green, mottled dark red and brown, calcareous, slightly silty with trace to 10% limestone as in 175 to 180 feet. Hematite concretions	20	180	200
	Maquoketa formation Brainerd member				
14.		Shale, light medium greenish gray streaked maroon and yellowish brown, in part massive, soft, dolomitic with few traces of argillaceous dolomite and limestone	30	200	230
15.		Shale 60%, as in 200-230 feet, with 20% to 25% dolomite, light gray, fine- to medium-grained, granular, dense, silty and argillaceous. Chert 15% to 20%, light gray, few embedded black specks and dolomite rhombs, dull, subconchoidal	10	230	240
16.		Shale, varicolored, calcareous, soft, structureless with trace to 10% dolomite and limestone, light medium gray, fine-grained, argillaceous	25	240	265
17.	No sample		10	265	275

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
18.		Shale, light medium greenish gray, very calcareous, soft, massive with 15% limestone, light medium gray, fine-grained, granular, slightly argillaceous. Chert or siliceous siltstone, trace to 5%, light gray, dull, granular, opaque	40	275	315
	Ft. Atkinson member				
19.		Limestone, light drabish gray, fine-grained, with abundant dark gray, coarsely crystalline fossil fragments embedded. Shale 20% to 40%, as in 275 to 315 feet	10	315	325
20.		Limestone, light gray and creamy drab, fine-grained, dense very argillaceous, few coarsely crystalline fossil fragments embedded, with 5% to 10% chert or silicified siltstone, light buffish-gray, few black specks, dull, granular, subconchoidal, opaque	15	325	340
21.		Limestone, light buff, fine- to medium-grained with few dark gray and brown coarsely crystalline fossil fragments embedded. Chert 30% at top grading downward to 10%, light buff and drab mottled, few black specks, subvitreous to dull, conchoidal to granular	30	340	370
	Clermont member				
22.		Shale, light medium greenish and bluish gray, very calcareous, massive, with 35% limestone 370-375 feet, light medium drab to gray mottled black, fine-grained, granular, argillaceous	20	370	390
	Elgin member				
23.		Limestone, light to light medium drab, gray, and buff mottled, fine-grained with coarsely crystalline fossil fragments embedded. Dolomite 10% to 40%, medium to dark brown and gray, fine- to medium-grained, silty, argillaceous, with few thin partings light bluish gray, noncalcareous, nonfissile clay	30	390	420
24.		Limestone, medium to dark brownish gray, fine-grained, slightly argillaceous. Dolomite trace as in 390 to 420 feet	5	420	425
25.		Dolomite 50% to 70%, medium drabish gray fine-grained, dense, granular, argillaceous, calcareous. Limestone 30% to 50%, light to medium drabish gray, fine-grained, very slightly argillaceous and dolomitic	15	425	440
	Galena formation				
26.		Limestone, light buff and drab, orange brown specks embedded, fine- to coarse-grained with very abundant coarsely crystalline crinoid stem fragments embedded	35	440	475

Survey No. K-1544

No.	Rock Unit	Description	Thick	From	To
27.		Limestone, light buff, fine-grained, with fossil fragments as in 440-475 feet, dolomitic, grading into 10% dolomite, light drab, medium-grained, granular, slightly calcareous	30	475	505
28.		Limestone, very light buffish drab, fine-grained, granular, dense, with fossil fragments as in 440-475 feet, dolomitic grading into 15% dolomite, light tawny brown, fine medium-grained. No sample 510 to 515 feet	20	505	525
29.		Limestone, as in 505 to 525 feet, with dolomite 25% to 50% at base, light tawny drab and brown, fine medium-grained, translucent, granular. Chert 5% to 10%, light gray, dull, granular, to vitreous, conchoidal, with embedded sponge spicules 550 to 555 feet	30	525	555
30.		Limestone, very light buff mottled dark gray by fossils, very fine-grained, dense, fossil fragments and light brown dolomite rhombs embedded. Chert 10% as in 550 to 555 feet	5	555	560
31.		Dolomite, light drab, fine- to medium-grained, dense, calcareous with 25% limestone, light buff, fine-grained, embedded dolomite rhombs and fossil fragments. Chert 15%, as in 550 to 555 feet	5	560	565
32.		Limestone, light buff and drab, mottled by dark gray fossil fragments, fine-grained, abundant dolomite rhombs, light tawny brown, fine medium-grained	35	565	600
33.		Limestone, light buff to greyish drab, heavily mottled black, fine- to medium-grained, with coarsely crystalline crinoid and brachiopod fragments and dolomite rhombs embedded. Chert trace to 10%, light drab speckled black, subvitreous, conchoidal, opaque	30	600	630
34.		Limestone, very light buff, slightly mottled dark gray, very fine-grained, granular, soft, with fossil fragments embedded as in 600 to 630 feet. Chert trace to 5%, as in 600 to 630 feet	30	630	660
	Devonian				
	Jefferson formation				
	Jefferson member				
35.		Limestone, light medium greenish gray with very abundant dark gray fossil fragments embedded, argillaceous with 15% limestone as in 630 to 660 feet	5	660	665
36.		Shale, light medium green, very calcareous, waxy, glistening, flaky, with 20% to 30% limestone, as in 660 to 665 feet, with abundant bryozoa and brachiopod fragments embedded	10	665	675

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
		Guttenberg member			
37.		Limestone, very light to light drab, mottled heavily by dark gray fossil fragments and speckled reddish brown in part, fine-grained with coarsely crystalline fragments of crinoids, brachiopods, and ostracodes embedded, dolomitic in part	15	675	690
		Platteville formation Spechts Ferry member			
38.		Shale, light green, calcareous, dull, faintly laminated, massive, soft	5	690	695
		Platteville (undifferentiated)			
39.		Limestone, light to light medium drabish grey and buff, mottled medium to dark gray by fossils, very fine-grained dense; trace brown, argillaceous limestone. Shale trace to 10%, light green, pyritic, noncalcareous, splintery	35	695	730
40.		Limestone, as in 695 to 730 feet with much dark gray fossil mottling. Shale trace, light bluish gray, noncalcareous, flaky, soft; phosphate nodules, trace 735 to 740 feet	10	730	740
		Glenwood member			
41.		Shale, light medium grayish green, very slightly calcareous, structureless, soft, with traces of limestone and phosphate nodules as in 730 to 740 feet	10	740	750
		St. Peter formation			
42.		Sand, white, major grade medium, subangular to curvilinear, well frosted by fine pits and grooves, trace cemented by pyrite 750 to 755 feet. (Average size grade analysis; ½-¼ mm. 65%, ¼-1/8 mm. 25%, 1/8-1/16 mm. 10%)	45	750	795
43.		No sample	2	795	797
		Prairie du Chien group Willow River formation			
44.		Sand, white, frosted, as in 750 to 795 feet (medium 40%, fine 25%) with 35% dolomite, pale to medium brownish grey and gray, fine-grained, subsaccharoidal to dense, granular, hard	11	797	808
		Total depth			808

OFFICE COPY

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

PUMPING TEST
Readlyn City Well
June 15, 1942

Location: SE¼ NW¼ SE¼ sec. 11, 91 N., 12 W.
Curb Elev: 1039 (K.E. Anderson)
T.D: 808 ft.
Casing record: 150 ft. of 10 in. casing 0 to 150 ft.
280 ft. 10 in. of 8 in. casing 134 ft. to 420 ft. 10 in.
159 ft. of 6 in. casing 649 ft. to 808 ft. perforated in lower 95 ft.

Pump: 5 3/4" Cyld. Power: Drill rig
Pump set at 132 ft. with 17 ft. of suction pipe

Measuring point ½ top 10 in. casing 0.25 feet above ground

TIME	WATER LEVEL	PRODUCTION G.P.M.	TEMPERATURE AIR	TEMPERATURE WATER	REMARKS
	34.1*				Static water level
6/15/42					
11:00a.m.					Pump started
1:51p.m.	76.6				
1:55			64°	49°	
2:00	77.0				Water sample taken
2:05					pH = 7.4 to 7.6
2:10	77.2	130			
2:30					Pump stopped
2:30½	52.3				
2:31½	40.9				
2:32	36.8				
2:33	35.8				
2:33½	35.5				
2:34					Pump started
2:34½	54.7				
2:35	64.7 — 30.6				
2:36	70.0 — 35.9				
2:37	72.3 — 38.2				
2:38	74.3 — 40.2				
2:39	74.4 — 40.3				
2:40	75.0 — 40.9				
2:48	75.6 — 41.5		64°	49°	
3:00	75.8 — 41.7				
3:10	76.3 — 42.2				
3:20	77.8 — 43.7				
3:30	76.9 —				
3:55	75.6				Fresh water sample taken
4:03	74.8				
4:04					Pump stopped
4:04¼	60.0	148			

* Static water level measured and reported by R.B. McAllister, State Dept. Health

CC TO K. O Becker, Readlyn, July 8, 1942 (by KEA)
cc to Thorpe Well Company, Des Moines, July 21, 1942.

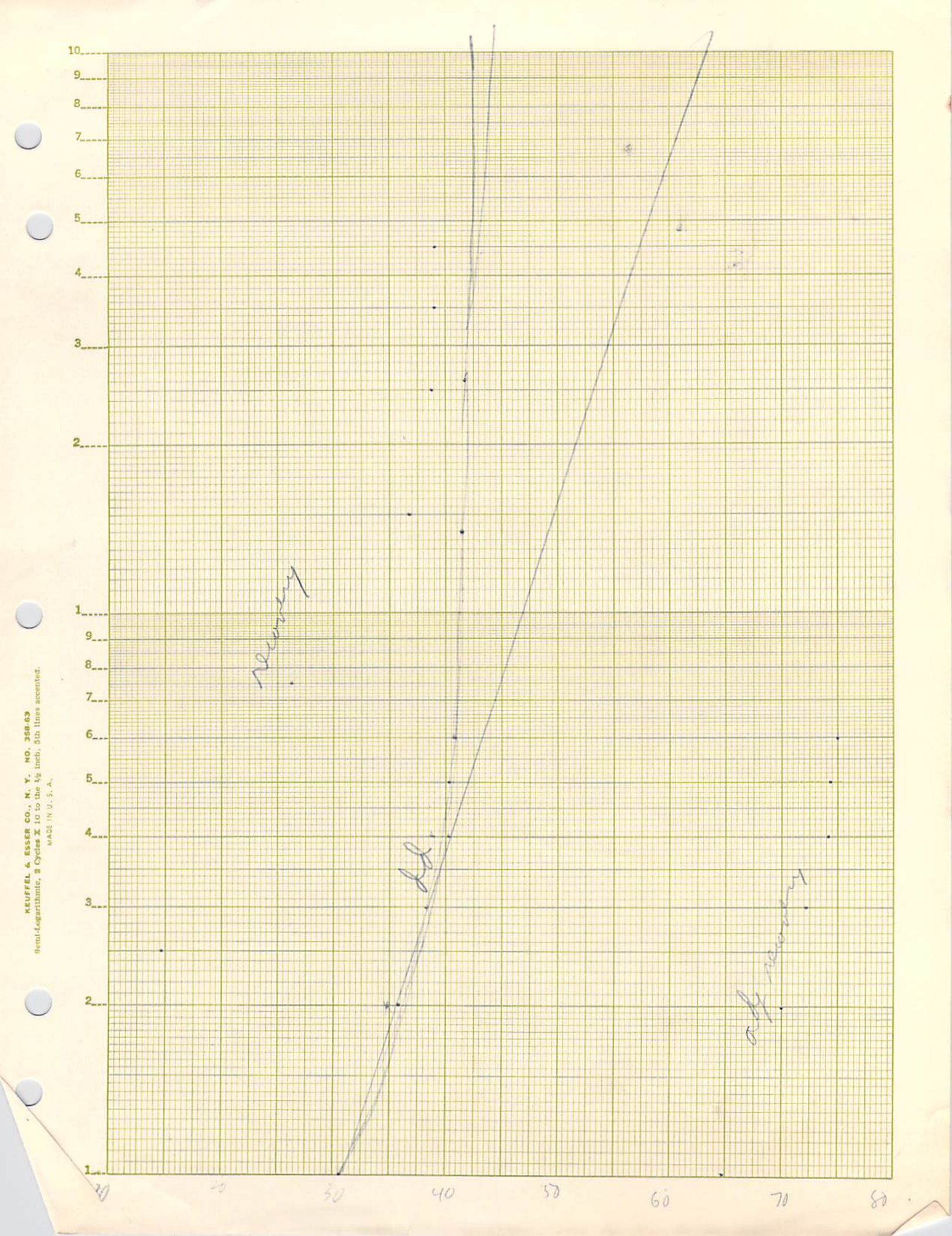
Pumping Test
Readlyn City Well
June 15, 1942

TIME	WATER LEVEL	PRODUCTION G.P.M.	TEMPERATURE AIR	TEMPERATURE WATER	REMARKS
	74.8				
4:04 3/4	48.6 — 36.2				
4:05½	38.1 — 36.7				
4:06½	36.0 — 38.8				
4:07½	35.8 — 39.0				
4:08½	35.8 — 39 0				
4:10	35.8 — 39				
4:11	35.8 — 39				
4:15					Started pulling pump
5:55	35.68 — 39.1				
6:00					Running bailer

Note: 6 in. casing had not been placed in hole when this test was run.

4:04 5 6 55

D.A. Davis



Readlyn (BREMER)

Results of visit to well, 5/28/42

Now drilling at 675-680'.

When well was 601' deep, test was made as follows: (in Prosser fm.)

S.W.L. 32' 3"
P.W.L. Approx. 82'
Production 125-130 g.p.m.
Pumped for about an hour. Pumping level constant.

Pipe record: 150' of 10" from 0-150. Cemented.
289' 10" of 8" from 134-424. Iron shoe at top inside 10".
(but no permanent seal between the pipes)

Samples were inspected in the field, with the top of the Ion shale member of the Maquoketa formation at about 664' and top of the Guttenberg member at about 671' which checks the section below the Maquoketa at Oelwein very closely. On that basis, a written forecast for continued drilling was given the Mayor as follows:

(Guttenberg)	675-690	Limestone, gray with some darker, perhaps a little shale.
(Sp.Ferry)	690-695	Limestone like above, with more green shale.
(Pec-McG)	695-740	Limestone, medium gray
(Glenwood)	740-750	Shale, green and soft. Some sand
(St.Peter)	750-800	Sandstone (St.Peter) medium grained, white.
(WillowR.)	800-	Limestone or dolomite, flinty, sandy

Advise drilling just into this last limestone."

Picked up samples to bring to Iowa City, and asked drillers to save all of the Glenwood shale that they could. Also asked them to be sure we were notified before the final pump test, which will probably be about Wednesday, June 3.

Additional drilling log:

200-320	Green shale and lime shells
320-335	Gray lime
335-370	Brown lime
370-398	Green shale
398-420	Brown & gray lime
420-445	Dark gray lime
445-660	Brown and gray lime
660-	Gray shale and lime

REA.

TELEPHONE CONVERSATION BETWEEN H. G. HERSHEY AND K. O,
BECKER, CITY CLERK, READLYN, IOWA,
APRIL 22, 1942

HGH: We have samples down to 142 feet and there is still a little indication there that there might be some oxidized water getting down to it, but I believe that if you go to 150 it will be safe to case there.

KOB: They are down to 150 now. They quit drilling at 151 feet. They are afraid that if they go much deeper they will run on to lime rock.

HGH: That is what I'm afraid of too and I think that it would be worth the chance to go ahead and case now.

KOB: ...

bailing at 150 feet and they went down another foot and they bailed again and said, "I think we will stop the . right now and wait until we get a report from Iowa City." Carl Allen

HGH: The samples look pretty good but I hope that at 150 they will be OK; you are below the level of your old well and I think it would be worth the chance.

KOB: ... old well 118 so we are 33 feet below old well bottom

HGH: ...
There is a little difference in elevation that goes in there too that has to be accounted for. If the shale should be lower than we expect, it may not be such a good chance, but if it is at 170 feet as we expect, it should be worth while casing.

...

He will run into stone and will have no place to set his casing in.

KOB: What time did you get the samples?

HGH: A little while ago.

KOB: ...

K.O.B - Yes! HGH?

HGH: You know the chances and what they are. Will you continue to send samples in to us?

K.O.B. Yes, every day.

April 21, 1942

Mr. T. W. Thorpe
2340 Sixth Avenue
Des Moines, Iowa

Dear Mr. Thorpe:

Prior to the time that the contract was let for the Readlyn town well the city officials had requested the Geological Survey for information and assistance in the planning and developing of their well. We did what we could in preparing a pre-drilling forecast and expressed our willingness to continue to be of service during drilling operations with the understanding that samples would have to be sent to us.

When one of our representatives called at Readlyn recently he was again requested for service. He pointed out that it would be necessary for us to have samples to carry on the necessary work. Accordingly samples to a depth of 120 feet were turned over to him.

We have studied the samples and find that the rock at a depth of 120 feet shows oxidation and apparently it is not yet safe to set casing if the possible contaminated waters are to be kept from the well.

In accordance with the request of the Readlyn city officials I am passing this information on to them. At the same time I feel that you should have an understanding of our position. I should be glad to have an expression from you in regard to it.

Very truly yours,

H. G. Hershey

HGH:N

How far is new location from old well? — ¼ mi
" " " " " nearest private well
to Silurian-Devonian? —
S.W.L. = 26' in old well.

MEMORANDUm

To: Dr. H. G. Hershey
From: K. E. Anderson
Subject: Water supply for town of Readlyn (Bremer Co.) Iowa. Result of field work Apr. 1 + 2, 1942.

The present town supply is derived from one well, 8" in diameter, and about 110' deep which has lately shown recurrent evidence of pollution and contamination. The well is located at NW/c-NE-14-91-12 and has a curb elevation of 1033'. It was drilled in 1913 by Ben Marsh of Fairbank, Iowa. Casing is reported to be from surface to 70'. Static level is 26' with pump set at about 75'. The well is used only a few hours a day andpumped at an approximate rate of 60 g.p.m.

For some time analyses of the water have shown it to be bacteriologically unsafe. A nearby well was suspected of being the cause of the trouble and it was plugged with clay. However, after a short period of pumping, some of the mud and clay from this plugged well began to enter the city well and cause trouble.

At that time, Mr. Winslow, driller from Decorah, was called in to pull the pump and make some tests on the well. In an attempt to determine how good the casing was, a plug was set at 67' and the water was pumped from the casing--at least such was the attempt, but pumping would not lower the water level materially and hence it was concluded that the casing was rather badly shot.

Water in the present city well is then entering from the upper 20' or so of Silurian (?) dolomites and limestones and also from zones in the drift through the faulty casing. If the figures are correct, the casing may not even extend to the top of the shattered and weathered bedrock.

Other wells in town almost all produce from about the same horizon, either the upper limerock or the sands and gravels lying upon this rock. In some cases, these other wells are known to be unsafe, and others are suspected of being such. There is nox sewage disposal system in town, each house having their own septic tank--with no true "cesspools" being in town though this statement is doubtful. At any rate, there is very good chance of surface pollution of almost the entire drift zone, as well as the upper limestone zones. Surface topography is very flat, with an estimated maximum of 5-10' of relief in the town proper.

With the above facts at hand, a meeting of the town council was called for 1 p.m. this afternoon (April 1, 1942) at which time I was requested to make a statement as to geologic conditions affecting the drilling of a new well.

I explained briefly the geology of the area, with the nature of the various formations, and gave them the thicknesses and depths as shown in the forecast prepared by Dan A. Davis. I also explained to them the possibility that the top of the Maquoketa formation might not be as deep as indicated (200') but might even be as high as 160-175' as Davis and I had figured previously--and that if such were the case the other depths would be adjusted correspondingly higher.

The limestone above the Maquoketa, possibly the Ft. Atkinson member of the Maquoketa, and the Galena dolomites and limestones were outlined as possible water-bearing horizons for the proposed well.

It was estimated that rock would be encountered in the new well at about 80 to 90 feet, as seems to be the case for this area, and that to provide absolute safety against contamination from this polluted zone the casing would have to be set into fresh rock, below the badly crushed, weathered, and rotten limestones and dolomites.

It was futher pointed out that this might mean as much as perhaps 120' of casing, and that if the Maquoketa werehhigh it would leave perhaps only 50' of Silurian (?) rocks as source of water. If that did not prove to be enough, it would mean deeper drilling, and if such drilling went into the Galena, it might (or better would) mean some sort of liner to guard against caving from the shales of the Maquoketa formation.

The proposed site for the new well, approved by Mr. MaAllister of the Health Dept., is at the north part of town, just under the standpipe, which is C-S½-NW-SE-11-91-12 and at an elevation of about 1035-1038'.

The council is in favor of immediately beginning work on a new well, so plans were formulated to get the machinery into motion for the project. Mr. McAllister recommended a 14" hole with 10" casing cemented top to bottom and set well into fresh rock. This met with the approval of all present, and all of them seemed to be sure that they wanted the casing set deep enough to prevent any possible contamination from the zone at the top of the limestones. Mr.McAllister recommended Winslow, Varner, Thorpe, and I threw in Nolan's name for consideration by the council before letting the contract for the work. They seem to be mostly in favor of giving the job to Winslow, but feel to satisfy the taxpayers they should at least get estimates from other drillers.

They are then asking each of these drillers for immediate estimates on a 14" hole to approximately 200' depth with 10" casing cemented to surface, with additional estimates for an 8" hole to 500' with 200' of 8" liner. As soon as they get replys, they will draw up the contract and proceed with the drilling. The water fund of the town now has between $1000 and $1500 available and they anticipate no trouble in raising the necessary additional funds. Two things seem foremost in their minds--speed in getting the job done, and being sure they shut out the contamination.

I explained again the basis on which we had drawn up our depth estimates and that our final report, which our office would submit within a day or two, might be changed somewhat if further information could be obtained while I was in the field here. I also explained that samples would be necessary for us to determine where the casing might be safely set and also to locate the well in the stratigraphic column in order to revise the depth estimates. They realized this fact and are willing to put in the contract that samples must be saved every 5' and forwarded to the Iowa Geological Survey.

They seemed anxious to get our whole-hearted cooperation during the drilling of the well and I assured them that everything possible would be done, and done as rapidly as possible, to help them in every way. I left 50 sample sacks with the Town Clerk, Mr. K. O. Becker, and the town will notify us when the contract is awarded and again when drilling commences.

In conclusion, then, it would be a good idea to send them as soon as is possible a final report on the geology of the area, with possibilities of production from each formation--explaining the uncertainty of depth figures until samples are available and can be studied. I am not too

hopeful of obtain ng any additional information which will help in forecasting the top of the shale. In the letter accompanying the report, it would be advisable to mention the sample clause in the contract, and remind them to notify us when the contract is let and when drilling commences. Reassure them that we will study samples, attend pumping tests, and in any other way possible help them with their water problems. They'll be friends for life of the Survey if this thing works out alright.

In view of the existing feeling, I feel personally that it would be better to err on the side of setting the casing too deep rather than not deep enough, even at the sacrifice of losing some water and perhaps necess itating their drilling into or below the Maquoketa for 50 g.p.m. I'd hate to have it polluted after our sample study!!

K.E.A.
4/1/42

Additional dope:

Klinger Co-op Creamery well
SW/c-26-91-12
T.D. 135' in gravel
Elev. 1030

Matthias farm well
SE/c-NW-35-91-12
T.D. 173', with 20-25' of limestone
S.W.L. 31'
Elev. 1031

P.S. Just talked with McGrew, of Thorpe Bros here at Oelwein, and he says that the Silurian contained water, in fair amounts, with S.W.L. around 18-20', and that the rock was soft throughout. He thinks that the Ft. Atkinson had some water too, but is not sure. Does not know about amounts in the Silurian however.

Sharff won't be in until 10 p.m. tonight and will see him then.

McGrew feels that it wouldn't be necessary to go into the Galena far for a fair supply. Must get this in the mail now.

Keith.

4

Town of Readlyn

Information from town marshal and mayor

T.D. 108-118', in limerock
6" hole all the way down
S.W.L. about 30'
Pump set at about 75', pumps 60 g.p.m. for 1½ hrs. per day
Standpipe is 3 blocks N. of well
Drilled in 1913 by (Ben ?) Marsh, now of Fairbanks, Iowa

Location: NW/c-NE-14-91-12
Elevation: 1033'

K.E.A.
12-8-41

To: H.G. Hershey

From: D.A. Davis

Subject: Forecast for Readlyn, Bremmer County, Iowa

Date: March 30, 1942

Readlyn is located in the southeast part of Bremer County in SE 1/4 section 11-T91N-R12W. The elevation at the station of the Chicago and Great Western Railway is 1030.5 feet. The population of the town is 426. The town is located near the divide about midway between the Wapsipinicon River on the east and Crains Creek on the west.

Superficial Geology.- The Readlyn area is covered by Nebraskan, Kansan, and Iowan drifts. The total thickness of the drift at Readlyn is about 80 feet. The Nebraskan is estimated to about 20 feet thick and the Kansan about 60 feet. The Iowan is a very thin veneer. Within the drift and possibly between the Nebraskan and Kansan beds of sand and gravel may be present.

Subsurface Geology.- The age of the bedrock is not known definitely. Norton (vol. 16, 1906) considered it to be Cedar Valley, but according to the Geologic Map of Iowa (1937) the bedrock beneath Readlyn is Silurian.

On the basis of Silurian bedrock the following subsurface section is estimated from a starting elevation of 1033 feet:

	Thick.	From	To
Pleistocene System			
Drift - sandy and gravelly clay possibly with sand and gravel lenses	80	0	80
Silurian System			
Dolomite	120	80	200✓
Ordovician System			
Maquoketa formation Brainard member - shale, gray to green, limy layers	120	200	320
Ft. Atkinson member- cherty limestone and dolomite	50	320	370
Clemmont member - gray to green shale, limy in part	40	370	410
Elgin member - limestone and dolomite, shale or shaly in lower part	40	410	450
Galena-Platteville			
Limestone, cherty in part, in upper 270 feet; limestone and shale beds in lower 50 feet	320	450	770
St. Peter sandstone	45	770	815

Some difficulties are encountered in the above estimate. First the age of the bedrock is questionable. Second, there appear to be structural conditions in Bremer County which bring the top of the Maquoketa formation above its position in a normal regional dip to the southwest.

There is insufficient information to get a true picture of the structural feature and to determine the location of Readlyn with respect to the feature. The estimates are based mainly on the projection of horizons between the Oelwein city well in Fayette County and the Waverly city well in western Bremer County.

Water Possibilities

Present Supply.- The present water supply for Readlyn is furnished by a well 108 feet deep which is drilled through 80 feet of drift and 28 feet into bedrock. The static water level is about 30 feet and the well is reported to pump 60 gallons per minute 1-1/2 hours per day. The casing in the well is reported to be in poor condition.

Pleistocene rocks.- Some water may be obtained from the sands and gravels in the glacial drift. This cannot be predicted with any certainty, however.

Silurian rocks.- The present Readlyn well produces from rocks which are considered to be Silurian in age. It is probable that additional wells drilled into these rocks in this locality will also produce sufficient water for the town. A Silurian well should be drilled through the entire thickness of the dolomite to the top of the Maquoketa shale. The character of the water that would be obtained is indicated in the table of water analyses by the mineral analyses from the present Readlyn well as well as from the Arlington and

Oelwein city wells all of which produce from Silurian dolomite. (Columns I, II, and III).

Ordovician rocks.- Lying immediately below the Silurian dolomite is the Maquoketa formation. The cherty dolomite member in the middle of this formation may produce some water. In the Sumner city well water was found in the Maquoketa at 260 feet which had a static level of 118 feet below the surface. There are no data on the production from the Maquoketa and no mineral analyses of unmixed water from the formation. (See mineral analyses table, Column VII).

In the Sumner city well and in the Waverly city well No. 2 water was found in the Galena-Platteville interval. The static head and the yield of this aquifer are not known for these wells. The analyses of Galena water mixed with other waters are shown for these wells under columns VII and VIII in the water analyses tables. Analyses of Galena water from the city wells of Clermont and Elgin in Fayette County are shown in columns IV and V.

St. Peter sandstone contributes to production in the Waverly city well No. 2 and probably also in the Sumner city well. In the Waverly well the St. Peter sandstone from 677 to 715 feet produced 150 gallons per minute. The well now produces from the Galena-Platteville, St. Peter, and Jordan beds. The well at Hawkeye in Fayette County produces from the St. Peter sandstone from a depth of 835 feet at 100 gallons per minute. The static head is 265 feet below the surface. (Column VI, analyses table).

	I Readlyn Bremmer County	II Arlington Fayette County	III Oelwein Fayette County	IV Clermont Fayette County	V Elgin Fayette County
T.D.	108	165	120	195	151
Elev.	1033				~~1172~~
Aquifer	Sil.	Sil.	~~Gal. Platt.~~ Sil.	Galena	~~St. Peter~~ Galena
Static level	30				~~265~~
G.P.M.	60				~~100~~
Draw-down					
Total solids	358	278	372	346	314
Alk(MeO)	309	232	164	298	264
R_2O_3	5.0	5.0	0.6	1.8	1.8
Na	21.9	11.1	11.6	8.6	7.3
Ca	74.8	53.8	64.0	87.8	78.3
Mg	20.7	22.1	15.4	24.8	22.9
Fe	1.4	0.3	0.2	0.1	Tr.
Mn	0.0	0.1	0.1	0.0	0.0
F	1.0	Tr.	Tr.	0.0	0.0
Cl	2.0	2.0	14.0	7.0	6.0
SO_4	1.2	13.8	57.3	21.4	33.7
HCO_3	377.0	283.0	200.1	363.6	322.1
Calc. Hard.	274	225	223	321	286

	VI Hawkeye Fayette County	VII Sumner Bremer County	VIII Waverly Bremer County
T.D.	835	1740	1263
Elev.	1172	1054	917
Aquifer	St. Peter	Maq., Gal. Oneota	Bal.-Platt. St. Peter Jordan
Static level	265	144	43
G.P.M.	100	200	695
Draw-down			233
Total solids	445	259	377
Alk(MeO)	270	240	292
R_2O_3	3.0	2.6	2.6
Na	50.8	26.6	47.9
Ca	57.8	48.2	60.7
Mg	34.4	22.2	29.7
Fe	0.2	0.1	0.8
Mn	0.0	Tr.	0.0
F	3.0	1.0	2.0
Cl	5.0	3.0	5.0
SO_4	117.1	36.2	65.9
HCO_3	329.4	292.8	356.2
Calc. hard.	285	211	275

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IOWA GEOLOGICAL SURVEY
Generalized Log Based on Detailed
Description of Drill Cuttings

Name of Well Readlyn City Well Survey No. W-1544

Location SE¼ SW¼ SE¼ sec. 11, T. 91 N., R. 12 W. (Bremer County)

Drilled by Thorpe Bros. Well Co.

Total Depth 808 ft. Curb Elevation 1039 ft. Static Level 34.1 ft.

Pumping Test 5 Hours 4 Min; Gal. per min. 130 Drawdown 25.9 ft. in min.

Casing Data 150' of 10" from 0 to 150'; 286' 10" of 8" from 134' to 420' 10"; 159'
of 6" from 649' to 808' perforated in lower 95'

Description of Formations

No.	Rock Unit	Thick.	From (feet)	To
	PLEISTOCENE SYSTEM			
1.	Clay, light yellow and gray mottled, noncalcareous, very silty with glacial sand and gravel of quartz and igneous rock embedded	15	0	15
2.	Clay, light yellowish brown, calcareous, silty with abundant glacial sand, gravel and pebbles	20	15	35
3.	Clay, light yellow and medium brownish gray mottled, calcareous, silty, sandy	10	35	45
4.	Clay, medium yellowish brown, calcareous, silty, with 20% to 25% glacial sand and gravel included	30	45	75
5.	Sand, major grade 2 to 1 mm., minor amounts of granules and pebbles, angular, polished, mostly quartz with some granite and limestone, silty	5	75	80
	SILURIAN SYSTEM (Undifferentiated)			
6.	Dolomite, light yellow and drab, medium-grained, dense, granular, with 15% chert, white, dull, granular to light gray, vitreous, chalcedonic, quartzose	10	80	90

Notes: cc to K. O. Becker, City Clerk, Readlyn, Iowa, July 22, 1942.
Thorpe Well Company, Des Moines, Iowa, July 22, 1942.

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
7.		Dolomite, very light yellowish gray, fine-grained, granular to medium-grained saccharoidal with 30% to 45% limestone, light orange brown, iron stained, sublithographic, and 5% to 15% chert as in 80 to 90 feet	15	90	105
8.		Dolomite, very light yellowish drab and brown, iron stained in part, fine- to medium-grained, dense, granular, subtranslucent, with traces chert as in 80 to 90 feet. Trace yellowish brown residual clay fissure filling 110 to 115 feet	30	105	135
9.	No sample		4	135	139
10.		Dolomite, very light gray to yellowish buff, iron stained in part, fine- to medium-grained, dense to saccharoidal, porous, with trace to 5% chert as in 80 to 90 feet, iron stained	20	139	161
	ORDOVICIAN SYSTEM				
	Neda (?) formation				
11.		Shale, light maroon stained yellow and green, very calcareous, massive, soft, with trace to 15% limestone, light gray stained yellowish brown, fine- to coarse-grained, soft, argillaceous. (Note - driller's log gives top of shale, hence Neda (?), at 151 feet)	14	161	175
12.		Limestone, pale to light yellow and gray, coarse-grained, dense, slightly argillaceous, with 30% shale, light greenish gray, very calcareous, slightly silty, soft	5	175	180
13.		Shale, light bright green to yellowish green, mottled dark red and brown, calcareous, slightly silty with trace to 10% limestone as in 175 to 180 feet. Hematite concretions	20	180	200
	Cincinnatian Series Richmond Group				
	Maquoketa formation				
	Brainerd member				
14.		Shale, light medium greenish gray streaked maroon and yellowish brown, in part massive, soft, dolomitic with few traces of argillaceous dolomite and limestone	30	200	230
15.		Shale 60%, as in 200 to 230 feet, with 20% to 25% dolomite, light gray, fine- to medium-grained, granular, dense, silty and argillaceous. Chert 15% to 20%, light gray, few embedded black specks and dolomite rhombs, dull, subconchoidal	10	230	240
16.		Shale, varicolored, calcareous, soft, structureless with trace to 10% dolomite and limestone, light medium gray, fine-grained, argillaceous	25	240	265
17.	No sample		10	265	275

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
18.		Shale, light medium greenish gray, very calcareous, soft, massive with 15% limestone, light medium gray, fine-grained, granular, slightly argillaceous. Chert or silicious siltstone, trace to 5%, light gray, dull, granular, opaque	40	275	315
		Ft. Atkinson member			
19.		Limestone, light drabish gray, fine-grained, with abundant dark gray, coarsely crystalline fossil fragments embedded. Shale 20% to 40%, as in 275 to 315 feet	10	315	325
20.		Limestone, light gray and creamy drab, fine-grained, dense very argillaceous, few coarsely crystalline fossil fragments embedded, with 5% to 10% chert or silicified siltstone, light buffish-gray, few black specks, dull, granular, subconchoidal, opaque	15	325	340
21.		Limestone, light buff, fine- to medium-grained with few dark gray and brown coarsely crystalline fossil fragments embedded. Chert 30% at top grading downward to 10%, light buff and drab mottled, few black specks, subvitreous to dull, conchoidal to granular	30	340	370
		Clermont member			
22.		Shale, light medium greenish and bluish gray, very calcareous, massive, with 35% limestone 370 to 375 feet, light medium drab to gray mottled black, fine-grained, granular, argillaceous	20	370	390
		Elgin member			
23.		Limestone, light to light medium drab, gray, and buff mottled, fine-grained with coarsely crystalline fossil fragments embedded. Dolomite 10% to 40%, medium to dark brown and gray, fine- to medium-grained, silty, argillaceous, with few thin partings light bluish gray, noncalcareous, nonfissile clay	30	390	420
24.		Limestone, medium to dark brownish gray, fine-grained, slightly argillaceous. Dolomite trace, as in 390 to 420 feet	5	420	425
25.		Dolomite 50% to 70%, medium drabish gray fine-grained, dense, granular, argillaceous, calcareous. Limestone 30% to 50%, light to medium drabish gray, fine-grained, very slightly argillaceous and dolomitic	15	425	440
	Mohawkian series Trenton group	Galena formation			
26.		Limestone, light buff and drab, orange brown specks embedded, fine- to coarse-grained with very abundant coarsely crystalline crinoid stem fragments embedded	35	440	475

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
27.		Limestone, light buff, fine-grained, with fossil fragments as in 440 to 475 feet, dolomitic, grading into 10% dolomite, light drab, medium-grained, granular, slightly calcareous	30	475	505
28.		Limestone, very light buffish drab, fine-grained, granular, dense, with fossil fragments as in 440 to 475 feet, dolomitic grading into 15% dolomite, light tawny brown, fine medium-grained. No sample 510 to 515 feet	20	505	525
	Prosser member				
29.		Limestone, as in 505 to 525 feet, with dolomite 25% to 50% at base, light tawny drab and brown, fine medium-grained, translucent, granular. Chert 5% to 10%, light gray, dull, granular, to vitreous, conchoidal, with embedded sponge spicules 550 to 555 feet	30	525	555
30.		Limestone, very light buff mottled dark gray by fossils, very fine-grained, dense, fossil fragments and light brown dolomite rhombs embedded. Chert 10% as in 550 to 555 feet	5	555	560
31.		Dolomite, light drab, fine- to medium-grained, dense, calcareous with 25% limestone, light buff, fine-grained, embedded dolomite rhombs and fossil fragments. Chert 15%, as in 550 to 555 feet	5	560	565
32.		Limestone, light buff and drab, mottled by dark gray fossil fragments, fine-grained, abundant dolomite rhombs, light tawny brown, fine medium-grained	35	565	600
33.		Limestone, light buff to grayish drab, heavily mottled black, fine- to medium-grained, with coarsely crystalline crinoid and brachiopod fragments and dolomite rhombs embedded. Chert trace to 10%, light drab specked black, subvitreous, conchoidal, opaque	30	600	630
34.		Limestone, very light buff, slightly mottled dark gray, very fine-grained, granular, soft, with fossil fragments embedded as in 600 to 630 feet. Chert trace to 5%, as in 600 to 630 feet	30	630	660
	Decorah formation Ion member				
35.		Limestone, light medium greenish gray with very abundant dark gray fossil fragments embedded, argillaceous with 15% limestone as in 630 to 660 feet	5	660	665
36.		Shale, light medium green, very calcareous, waxy, glistening, flaky, with 20% to 30% limestone, as in 660 to 665 feet, with abundant bryozoa and brachiopod fragments embedded	10	665	675

Survey No. W-1544

No.	Rock Unit	Description	Thick	From	To
		Guttenberg member			
37.		Limestone, very light to light drab, mottled heavily by dark gray fossil fragments and speckled reddish brown in part, fine-grained with coarsely crystalline fragments of crinoids, brachiopods, and ostracodes embedded, dolomitic in part	15	675	690
		Black River group			
		Platteville formation			
		Spechts Ferry member			
38.		Shale, light green, calcareous, dull, faintly laminated, massive, soft	5	690	695
		Platteville (undifferentiated)			
39.		Limestone, light to light medium drabish gray and buff, mottled medium to dark gray by fossils, very fine-grained dense; trace brown, argillaceous limestone. Shale trace to 10%, light green, pyritic, noncalcareous, splintery	35	695	730
40.		Limestone as in 695 to 730 feet with much dark gray fossil mottling. Shale trace, light bluish gray, noncalcareous, flaky, soft; phosphate nodules, trace 735 to 740 feet	10	730	740
		Glenwood member			
41.		Shale, light medium grayish green, very slightly calcareous, structureless, soft, with traces of limestone and phosphate nodules as in 730 to 740 feet	10	740	750
		Chazyan series			
		St. Peter formation			
42.		Sand, white, major grade medium, subangular to curvilinear, well frosted by fine pits and grooves, trace cemented by pyrite 750 to 755 feet. (Average size grade analysis; ½-¼ mm. 65%, ¼-1/8 mm. 25%, 1/8-1/16 mm. 10%)	45	750	795
43.		No sample	2	795	797
		Beekmantown series formation			
		Prairie du Chien ~~group~~			
		Willow River formation member			
44.		Sand, white, free, as in 750 to 795 feet (medium 40%, fine 25%) with 35% dolomite, pale to medium brownish gray and gray, fine-grained, subsaccharoidal to dense, granular, hard	11	797	808
		Total depth			808