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Sources of water: Frincipal <u>Malena & St. Peter</u> ; Others;		
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Production data:		Date	- 15 194A
Static depth to wat	tar 341	Measuring or	pint.
Pumping level	77	at /3	Q g-D-ID-
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Specific conscitu	30 90	ner ft dravdovr	· Temperature 49 OF
DPECIIIC Capacity_	Below	· por rot drawdom	
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 ANALYSE	S (in parts per mi	illion)
Date sampled	June 15 1942	CARARDA -	
Sampled by	D.A. Davis		
Total solids	416		
Insoluble matter	7.0		
Alkalinity (Neo)	326.0		
Alkalinity (Phn)	0.0		
pH .	7.4		
Fe203+ Mn203+Al203 -	19.5		
Alkali as sodium	33.0	- the factor is	
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)			
Remarks			
Laboratory data:		Sampl	e storage location
Sample range) - 808 No.	spls	No. dupls. & cond. 174 good
Spls. prepared by /	tawking Cassier Via:	shed range	by
Driller's log and	· Prevared by	Studied	by Strip log
Migroscopic study	J. B.C	strip log	
Gen. log	· ·	Correl. by	Carrier

WATER LEVEL DATA

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Measuring point _____

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WELL SCHEDULE US GEOLOGICAL SURVEY IOWA DISTRICT WRD

WELL NO 1544	COBREMER
OWNER CITY WELL	ADDRESS READLYN
DRILLER THURPE	DATE DRLD 6-1942
NAP	
SOURCE OF DATA FILE	
DESCRIPTION M.P_LSD	FEET (ABOVE) LSD

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WELL-DESCRIPTION CARD - B

	DEPTH OF WELL	ACCURACY	DEPTH CASED OR FIRST PERF	DIAM. INCHES	HEAD	VILLED DRILLED	PUMP	METH. LIFT	SHALLOW POWER	A	LTITUDE OF LSD (FEET)	ACCURACY	WATER LEVEL (FEET)	ACCURACY	MONTH	ATE	YIELD OF WELL (GPM)	1011 101		DRAW- DOWN (FEET)	ACCURACY	PUMPING PERIOD (HOURS)	IRON	SULF	CHLOR		OF TE	WATE AP	OATE	CAND CAND DEGIO.
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HYDROGEOLOGIC CARD-C

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CASING A Jei: deepei	CASING AND SCREEN (SIZE, TYPE, INTERVALS): I deepened by Hoeg + Ames from SOS - 868 (1959) CODED BY MACGOWAN (KV) DATE 8-15-72																														
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150' ~	- - -	ΑC.		r.		'																		,		- (1			-1		54

VERIFIED BY_

150 of 10" from 0-150" 286'10" of 8" from 134'-420' 159' of 4" from 649'- 808'



DATE ____

Boyd : Irwinns I Well sut to Thomps 7) 170' Well sunt 170p Soil = 0-2 Yullow Clay: 2-65 Br. Lime: 65-134 Red Sholo 134-170 17.2" \$ 18" 19 -1 1/12° 2yds-25hots of Cement damped in 94 '-1" such at 130' war 30 -150 5 - 170 = *P.P.* = 360 gpm = 4.4. = 4 Completed : 9/15/57 = 90 go

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±9	0	80 <u>+</u> 1
SILURIAN SYSTEM			
Dolomite, cracked, creviced, leached and weathered at top	901	80 <u>+</u> 1	170 151
ORDOVICIAN SYSTEM Maquoketa formation			
Brainard member - shale, gray to green, limy layers	120*	1905/51	290* 27/
Ft. Atkinson member - cherty lizestone and dolomite	50*	290 271	3401 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*	3801361	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	451	740 721	785+766

The Mayor and City Council, Readlyn

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Because of other contaminated wells in town which terminate in the Silurier 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 fest 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 onsing 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 cwsing 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 Maquokets 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.a. within 75-160 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 acidize 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. The Mayor and City Council, Readlyn

-3-

April 2, 1942

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 clork (The mayor & City Council)

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

February 8, 1960

Presento Reallyn General

TO: H. G. HersheyFROM: C. N. BrownRE: Readlyn Muni. Water SupplyDATE: 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 quite.

See attached log and drawing.

Deep Well Readly 41/60 " Aolo to 30 CB 125- 30' comet -12" hale (min)? \$0'- 150 ,36 i 2-2 2 150 161-8 420 10 6.49 6" linet bottom 95 perforted. These bits have became completely, menocobly stuch - The bottom post of the in lost. hol

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

Name of Well City Tell	Survey No. W-1544
Location _ 38 38 68 00. 11, 7, 91 8. 8. 12 8. (Brower (leve ty)
Drilled by Thomas Brog. Sold Co.	
Total Depthft. Curb Elevationft. Static	c Levelft.
Pumping Test Hours Min; Gal. per min Draw	wdownft. inmin.
Casing Data 152" of 12" from 0 to 353", 206" 12" of 6" from	1 334* to 400*80*; 350*
of 6" from 649" to 808" perforated in lower 95"	
Description of Formations	Thigh From To
No. Rock Unit	(feet)
PLEISTOCENE STATEM	

3.	City, light yellow and gray mutiled, nonceleareous, wery s with glasial and and gravel of quarks and igneous rock embodded	1149 15	0	15
2.	Clay, light yellowish brown, calcargons, cilty with abundant glacial sead, gravel and pebbles	20	15	35
3.	Clay, light gellow and medium brownish gray mottled, enlowreous, silty, condy	10	35	45
he	Clay, medium yellowish brown, coloureous, silty, with 20% to 25% glacial gaud and gravel included	30	45	75
5.	Sand, major grade 2 to 1 ms., sinor amounts of granulos and publics, angular, poliched, mostly quarts with same granite and himsetone, silty	5	75	80
57L9	RIAN CIUTUM (Undifferentiated)			
6.	Dolomite, light yellow and drob, medium-grained, dense gra- ular, with 15% abort, white, dull, granular to light gra- vitreous, shalesdonis, quartasse	-	85	93

85 93

Notes:

Survey Ro. 8-1544

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<u>No.</u>	Rock Unit	<u>Baseription</u>	<u>bick</u>	<u>Aron</u>	To
7.	Dolopito, very li ular o sectium- limestone, lig lithographic,	ght yellowish gray, fine-grained, gran- grained succharoldal with 30% to 45% bt orange brown, iron stained, sub- and 5% to 15% chert as in 30 to 90 feet	15	93	105
.	Delowite, very li in part, fine- translucent, w Prace yollowie to ll6 cost	ght yollowish dreb and brows, iron stains to asdium-grained, dense, granular, sub- ith traces chort as in 83 to 90 feet. h brows residual clay fissure filling 113	đ		564
•			55	1433 1	135
94	No samplo	•	4	135	139
10.	Bolosite, very li is part, fine- porcus, with t ctained	ght gray to yellowish buff, iron stained to medium-grained, dense to saccharoidal race to 5% chort as in 20 to 90 foat, iro	, D 20	139	161
ordo	VICIAN SYSTEM Nede (?) formati	33			
11.	Shalo, light serv sassive, soft, stained yellow argillascous. bence Seda (2)	on stained yellow and green, very celease with trace to 15% linestone, light gray ish brown, fine- to coarse-grained, soft, (Note - driller's log gives top of shale at 151 feet)	0439 	343	1.72
10			4 45	A 1 2 A	#13
124	LLECTORO, 3210 E dense, olighti; groenish gray,	o light yollow and gray, coarse-grained, y orgiliaceous, with 30% shale, light very calcoreous, slightly silty, soft	5	175	163
13.	Shale, light brig red and brown, 10% linestone a cretions	at greep to yellowish green, sottled dark culcarcova, olightly silty with trace to as in 175 to 183 feat. Remutike con-	20	16)	203
	Sequebots forsati Breinere menber	ion P			
14.	Shale, light acdiv yellowich brow few traces of :	le greenish gray stranked aeroon and , in part mussive, soft, dolonitic with orgillaceous dolomite and lineatone	39	200	230
15.	Shale 63%, as in f light gray, fir cilty and argin fow embedded by	203-233 foot, with 20% to 25% dolarite, no- to medium-grained, granular, domeo, Llaceous. Chort 15% to 20%, light gray, lack specks and dolarite rhomba, dull,		- 25 	
	aubeoncholdul		10	233	243
16.	Shale, varicalared trace to 195 de fine-grained, o	l, calcoreaus, soft, structurelees with plomite and linestone, light medium gray, argillaceous	25	240	265
17.	No sample		10	265	275

-2-

Servey No. 18-1544

Re.	Rack Epst	<u>Peacription</u>	<u>Thick</u>	Prom	To
18.	Shelo, light active growish a massive with 15% linestone, grained, granular, slightly sillalaus alltatone. frace	pay, very calcareous, coft, light medium gray, fine- orgillaccome. Chort or			•
	granular, spaque	a the transferst and	40	275	315
· .	Ft. Atkinson member	ىن			
19.	Linestono, light drabiab gray, dark gray, coarsoly crystal bedded. Shele 23% to 43%,	, fine-grained, with abundos Live Scanil Fragments on- oo in 275 to 315 feet	10 IO	915	325
29 •	Linestone, light grey and even dense very argillaceous, fo fragaents cabadded, with 53 siltstone, light buffish-gr	wy drab, fine-grained, >> soarsbly crystalling fost i to 13% chort or silicified wy, for black speeks, dull,	31 I		
•	gradular, subconchoidal, og	regue .	15	J.5	343
21.	Linestone, light buff, fine- (dark groy and brown coarsel ments embedded. Chort 33% 13%, light buff and drab so subvitreous to dull, conche	to medium-grained with few y arystalline feasil frag- at top grading domaard to ttled, few black specks, ideal to granular	30	340	572
	Clernont seaber				
22.	Stale, light polius groenish o careous, gaswive, with 35% light modium drab to gray a	nd bluich gray, very cal- limentone 370-375 feet, wttled black, fine-grained,		۴.T.G	030
	granular, argulaneous	•	63	315	250
	Algin neador				
23.	Limentono, light to light nodi cottled, fine-grained with fragments embedded. Bolowi dark brown and gray, fine- argiliaceous, with for this noncalcercous, nonfissile of	us drad, gray, and buff conrocly crystalling fossil to 175 to 435, sodius to to nedius-grained, allty, partings light bluish gray lay	7 . 30	3 93	420
24.	Linestone, nodium to dark brow slightly argillacoous. Dol 420 feat	mish gray, fino-grained, lomito traco as in 393 to	5	420	425
25.	Dolomito 53% to 70%, medium da danse, granuler, argillacoo 30% to 50%, light to medium very slightly argillaccous	which gray fine-grained, no, calcarcous. Linestone a drubich gray, fine-grained and dologitic	} , 15	1,25	440
	Colene formation				
26.	Lisostono, light buff and drab fino- to course-grained wit erystullino crinoid atea f:), orange brown specks esbet In very chundant coarsely regnents ambeddod	lded, 	440	475
	-				

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Survey So. 8-1544

••• . •

No.	Rock Bast	<u>Beachistics</u>	<u>Mick</u>	From	20
27.	Livestone, light buff, sents as in 440-475 17% colorito, light slightly colcarcous	fine-grained, with foosil frag- feat, colositic, grading into brab, modina-grained, granular,	30	475	505
28.	Linestons, very light in dense, with fossil fi tic grading into 155 nodium-grained. No (affieb drab, fino-grained, granul regents as in 440-475 foot, data dologito, light taway brown, fin maple 510 to 515 foot	8 P ; 18 8 - 10 23	505	525
29.	Lisestone, as in 505 to at base, light tanny translucent, granular granular, to vitrees spicules 550 to 555	525 feet, with delouite 25% to 5 drab and brown, fine medium-graf r. Chart 5% to 10%, light gray, s, concholdal, with embedded spor feet	ns aull, igo 33	525	555
30.	Linestone, very light b very fine-grained, d brown calcuite rhomb 555 feet	aff pottled dark gray by foodile, mon, fossil fragments and light e embedded. Chert 105 as in 590	to 5	5 53	96 3
A.	Dolomito, light drab, fi cereous with 25% light cabadded dolomito rhi 15%, as in 553 to 55	ine- to applus-grained, dense, cs estone, light buff, fise-grained, and fossil fragments. Chort 5 feet	<u>9</u> 5	560	565
32.	Lizestono, light buff and frageonts, fino-grain taway brown, fino zes	s dueb, mottled by dark gray fess sed, obundant dolorite rhombs, li dium-grained	uil Ight 35	565	633
33.	Linestone, light buff to black, fine- to modit crimpid and bruchiops ombedded. Chort tran subvitreous, canchoid	o grayish drab, heavily nottled m-grained, with conrecty crystal of fragments and dologito rhombs so to 10%, light drab speeked bla ki, spaque	.1 iuo 162, 39	633	630
34.	Limestone, very light by very fine-grained, gr enbedded as in 600 to in 600 to 630 feet	aff, olightly mottled dark gray, rander, coft, with focall frage 5 633 feet. Chert trace to 5%, c	nto Mto Mo 30	630	660
• .	Desorah foreation Ion acader				
35.	Linestone, light sodium dork gray fopsil fra 15% lizestone as in (groanich gray with very abundant geente embedded, argilleceous wit 530 to 660 Seet	ah S	660	665
36.	Shalo, light acdium gree flaky, with 20% to 30% with abundant bryocos	en, very calesroous, waxy.glisteni 5 lizostono, as in 660 to 665 fee 2 and brachio:ed fragments cabedé	ny, it, ied 10	665	675

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Survey Bo. 13-1544

5.35

Ro	Rock Colt	<u>Deveriation</u>	<u>bior</u>	Fran	10
•	autionborg cember				
37.	Lineatone, very light to light dark gray fossil fragments in part, fine-grained with ments of crinoids, prechop bedded, doloaltic in part	drab, nottled heavily by and speckled redulah brom coarsely crystalling frag- sic, and ostracodes en-	15	675	690
	Plattoville formation Spechts Forcy member				
38.	Shale, light green, culcarcous casaive, sort	, cell, faistly isminated,	5	690	695
	Plattevillo (undifferentiated)				
39*	Educations, light to light modi mottled medium to dark gray grained dense; trace brown, Shale trace to LCS. light a	un drabish gray and buff, by foscilo, very fize- argillescous limestone. Feen. syritic. noncalcarcous			
	aplintery		35	695	730
49.	Lisaatomo, an in 695 to 730 fac mottling. Shale traco, ligh floky, soft; phasphate nodu	t with such dark gray fopsil It bluich gray, noncolcercous Les, trace 735 to 743 feet	1 3	73 0	740
-	Clonwood sember				
41.	Shele, light motium grayish gr atructuroloss, ceft, vith t phate nodules as in 730 to	een, very slightly calcareou reces of limestone and phos- 740 feet	D, 10	740	750
	St. Peter formation				
42.	Sand, white, major grade madiu well fronted by fine pite a by pyrite 750 to 755 feet. by an. 655, 2-1/6 mm. 255,	a, subsected of the survillegar ad grooves, traco comented (Average tize grade energy 1/3-1/16 mm. 105)	9 81 45 -	753	795
43.	No sample	• .	2	795	797
Pi 46a	sirie du Chien group Billar River forsetion Send, shite, froe, co in 750 t	o 795 foot (nodlus 40%, fise			
	255) with 355 doloalto, pale gray, fino-grained, subsace	to sedius brownish gray and hereidal 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 Survey No. W
Location NR: SR: SR: sec. 11, 7. 91 H., B. 12 M. (Brener County)
Drilled by Tharse Ross, Tell Co.
Total Depthft. Curb Elevationft. Static Levelft.
Pumping Test Hours Min; Gal. per min Drawdownft. in min.
Casing Data 153* of 10* from 0 to 153*; 286* 10* of 8* from 136* to 423*80*; 153*
of 6" from 649" to 808" perforated in lover 95"

Description of Formations

No.	Rock Unit	Thick.	(feet)	10
PLEX	OTOCENE STOTOM		(1000)	
2.	Clay, light yollow and gray mottled, noncelearoous, very	silty		
	empoqued and the fields of desire such theorem ton	15	0	25
2.	Clay, light yellowish brown, calcareous, silty with abundant glasial and, graval and publics	20	15	35
3.	Clay, light yellow and medium brownish gray motiled, calcoreous, silty, condy	10	35	45
4.	Clay, medium Fellowish brown, calcareous, silty, with 20% to 25% glacial gand and gravel included	30	45	75
5.	Sand, major grade 2 to 1 mm., minor amounts of granules and pobbles, angular, poliched, mostly quarts with some granite and limestone, silty	5	75	80
SILO	NIAN STRTEN (Undifferentiated)			
6.	Bolomite, light gellow and drob, medium-grained, dense, gr ular, with 155 chert, white, dull, granular to light go vitreous, chelesionic, quartasse	na- ny, 10	83	90

Notes:

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<u>No.</u>	Nock Unit.	Beserintion	<u>Mick</u>	Prom	<u>\$0</u>
7.	Bolomite, very ligh ular to seeium-gr limestone, light lithographic, an	t yellowish gray, fine-grained, gran- wined succharoldal with 30% to 45% t orange brown, iron stained, sub- ud 5% to 15% chert as in 80 to 90 fest	15	92	105
8.	Bolomito, very ligh in part, fine- t translucent, wit Trace gallowish	t yelleriah dreb and brown, iron staine o modius-grained, dense, granular, sub- h traces chort as in 80 to 90 fest. brom readdual clay fissure filling 110)d ;		
	to 115 Peet		30	105	135
9 .	No sample		4	135	139
10.	Bolocite, very ligh in pert, fine- t porcus, with tra steined	t grey to yellowish buff, iron stained o selium-grained, dence to succharoidal co to 5% chert as in 20 to 90 feat, iro		139	161
ordi	VIGIAN SYSTEM Bode (7) formation				
11.	Shalo, light caroon Eansivo, soft, c stained yellocid argillaccous. (hence Neda (?),	stained yellow and green, very calcare ith trace to 155 limestone, light gray b brown, fine- to coarse-grained, soft, Note - driller's log gives top of shale at 151 feet)	999999 14	161	175
12.	Linestone, pale to dense, elightly (greenish gray, w	light yellow and gray, coarec-grained, argillaceous, with 30% shale, light ary calcoreous, slightly silty, soft	5	175	183
13.	Shale, light bright red and brown, c 105 linestone as crotions	green to yellowish green, mottled dark alcoreous, elightly silty with trace to in 175 to 180 feet. Hematite com-	20	193	205
	Sequebete forestie Brainerd member	B			
14.	Shelo, light actius yeliouleh brown, for traces of org	greenish gray streaked aaroon and In part measure, soft, colonitic with gillacoous dolomite and lineating	30	200	230
15.	Shale 63%, as in 2% light gray, fine silvy and argills few embedded blac subconcholdwl	0-230 fost, with 20% to 25% dolonito, - to acdius-grained, granular, dense, secons. Chort 15% to 23%, light gray, ek specke ond dolonito rhombo, dull,	10	230	240
16.	Shale, varicolored, truce to 19% dola fine-grained. ar	calcoreous, soft, structureless with mite and linestone, light medium gray, gillaceous	25	210	265
17.	So parale	•• •	10	265	275

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Mo.	Rack Unit	<u>Description</u>	<u>Talok</u>	Prom	To
18.	Shale, light active greenich gray nachive with 15% linestone, li grained, granular, slightly or gilicians at twose, trace to	, very calcareous, soft ght modium gray, fine- gillaccous. Chort or 55. 1 obt. gray. dubl.			•
	granular, spaque	209 and 1900 a 190 and 2 march 2	40	275	315
	Ft. Atkinson combor	\$			
19.	Linestone, light drabish gray, fi dark gray, coarsely crystallin bedded. Shele 20% to 40%, as	ne-grained, with abundan e fossil fragments en- in 275 to 315 feat	nt 10	<u>915</u>	325
20.	Limestone, light gray and crossy dense very argillaceous, for a fragments embedded, with 5% to siltatone, light buffish-gray, granular, subconchoidel, openy	drab, fino-grained, coarcely crystalline fos 19% chert or allicified for black speeks, dull, 19	911 1 15	¥25	340
21.	Limestone, light huff, fine- to a dark gray and brown coaracly o ments exhedded. Obert 30% at 10%, light baff and drab mottl subvitreous to dull, conchoide	edium-grained with few erystalline fossil frag- top grading downward to ked, for black specks, il to granular	30	340	370
	Clereont sember				
22.	Malo, light actium greenish and cureous, magnive, with 35% lis light cadius drab to grey not greenics, argillaceous	bluish gray, very cal- motone 373-375 fast, led black, fine-grained,	20	37)	3700
	Algie member				
23.	Limentono, light to light sedius sottled, fine-grained with con- fragments exhaded. Dolonite dark brows and gray, fine- to argillaceous, with for this pa- noncalesrence, sonfiscile clay	drab, gray, and buff arealy crystallino fossi 13% to 43%, actium to medium-grained, ailty, artiege light bluish gray	1 7 . 30	3 %3	420
24.	Linestone, autium to dark brownia slightly argillaceous. Dolam 423 feet	ah gray, fino-grained, Ito truco as in 390 to	5	420	425
25.	Dolomito 50% to 70%, medium drabi dense, granuler, argillaccous, 30% to 50%, light to medium dr very cligatly argillaccous and	ah gray fino-grained, , calcarcons. Linestone abiah gray, fino-grained) dolomitic	l _s 15	425	449
	Colone formation				
26.	Lisostone, light buff and drab, o fine- to coarse-grained with a crystallino crinoid stee frage	orango brown specks erbe Jery abundant coarsely 108ts esbedded	lded, 35	440	475

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No.	Rock Unit	<u>Desertation</u>	Thick .	From	20
27.	Lincotone, light bu nents as in 449- 17% colosite, li slightly colcare	ff, fine-groined, with fossil frag 475 feet, delevitic, grading into ght drab, medium-grained, granular coue	* 30	475	505
28.	Lizostono, very lig desse, with fose tic grading into acdium-grained.	At baffleb drab, fine-grained, gra Al fragments as in AAS-A75 foet, d 15% dologito, light taway brown, No sample 510 to 515 feet	nuler, 91091- fing 20	505	585
29.	Lisestopo, as in 50 at base, light t translucent, gro granular, to vit criculas 551 to	5 to 525 feat, with dolowite 25% a amy drab and brown, fine medium-g mular. Chert 5% to 10%, light gra reaus, conchoidal, with embedded a 555 feat.	o 575 rained, y, dull, 92950 33	695	555
30.	Limostono, very lig very fine-graine brown dalosite : 555 feet	ht buff mottled dark gray by fond d, dense, fossil fragments and lig hombe embedded. Chart 135 as in 5	1a, ht 50 to 5	555	560
<u>9</u> 1.	Dolomito, light dro carcous sita 259 embadded dolomit 15%, ac in 550 (b, fine- to active-grained, dense, Lisostone, light buff, fine-grain to rhoubs and fossil fragments. Ch to 555 feet	cal- ed, ort 5	560	565
32.	Lisostone, light but fragments, fine- teway brown, fir	?? and drab, soltled by dark gray ? grained, obundant dolomits rhoubs, le sedius-grained	osail light 35	565	600
33.	Linestone, light by black, fine- to crimats and brac cubadded. Chert subvitresse, cor	off to grayish drab, heavily sottle medium-grained, with coursely crys chieped fragments and deleaste rhom t trace to 10%, light drab specked scholdel, spaque	ŝ Ac iline Ibs black, 33	633	630
34.	Lisectone, very lig very fine-grains enbedded as in (in 600 to 630 fo	At buff, olightly mottled dark gr d, granular, coft, with fossil fra 60 to 630 feet. Chort trace to 55 est	ay. 4/dents , es 33	630	660
	Descrah formetion Ion Manhor				
35.	Linestone, light ac dark gray fossil 15% linestone ac	dium groanich gray with vary abund Fregments embedded, argillaceaus in 630 to 660 Seet	ant With 5	660	665
36.	Shalo, light and us flaky, with 20% (with abundent bu	green, very calearcous, waxy,glist © 305 limestone, as in 660 to 665 yoses and brachioust framents cob	oning; feet; edded 10	<u> 665</u>	675

•

" -le: s.

Survey 25. 12-1544

1.12

Re-	Rock Onlt	Desoription	<u>bick</u>	ALOD	To
	Outienbory center				
37.	Linestano, very light to l dark gray fossil fragm in part, fine-grained ments of orinoids, bra bedded, dolowitic is	light drab, mottled heavily by ments and speckled raddigh brown with coarsely crystalling frag- cohiopods, and ostracodes an- wrt	15	675	690
•	Platteville formation Spechts Forry sembar				
38 .	Shele, light green, calco eassive, soft	arcous, cull, faintly laminated,	5	690	695
	Plattovillo (undifferentia	ated)			
39.	Lisectone, light to light sottled sedius to dari grained dense; trace l Shale trace to 10%. li	t actium trabich gray and buff, I gray by foscils, very file- brown, argillacoous linestone. Wht green, pyritic, noncalcarcov	B e		•
	splintery		35	695	730
49.	Lisastone, as in 695 to 7 sottling. Shale truco, flaky, soft; phosphate	30 foot with such dark gray fossi , light bluich gray, noncelesroou > nodules, trace 735 to 743 feot	1 8, 10	730	740
	Glenwood genber				
41.	Sbale, light medium gray: structuroless, coft, r phate nodules as in 7	leh green, very slightly calcares with traces of limentone and phos 30 to 740 feat	10	749	750
	St. Poter formation				
42.	Sand, shite, sajor grade well frosted by fine by pyrite 750 to 755 g-j sm. 655, g-1/8 um	zefium, subangular to ourvilinea pite and grooves, trace commund feat. (Avarage vice grade enalys . 255, 1/8-1/16 mm. 13%)	r, 10; 45 -	753	795
43.	No supple		2	795	797
P	rsirio du Chica group	· · ·			
440	Sond, White, Free, 69 in 255) with 355 colonity gray, fine-grained, s	750 to 795 fact (modium 40%, fin 2, pale to modium brownish gray an ubsaccheroidal to dense, granular	0 G , hard		
			11	797	808
	total depth				878

IOWA GEOLOGICAL SURVEY Iowa City, Iowa

PUMPING TEST Readlyn City Well June 15, 1942

Location: SE¹/₄ NW¹/₄ SE¹/₄ 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 2 top 10 in. casing 0.25 feet above ground

TIME	WATER LEVEL	PRODUCTION . G.P.M.	TEMPERATURE AIR WATER	REMARKS
	34.1*			Static water level
/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
2:30불	52.3			
2:31를	40.9			
2:32	36.8	1 1 1 1		
2:33	35.8			
2:33출	35.5			
2:34				Pump started
2:34금	54.7	/		
2:35	- 64.7 - 30.0	, G		
2:36	70.0-38	2		
2:37	72.3 40	2		
2:38	74.3	3		
2:39	74.4 - 70	9		
2:40	75.0-11	5	0 0	
2:48	75.6-	7	64 49	
3:00	75.8	2		
3:10	76.3 - 72	7		
3:20	77.8	·*	Sec. 12	
3:30	76.9-			The second states
3:55	75.6			Fresh water sample taken
4:03	74.8			Dump atauned
4:04	10.0 111	~	•	Fump stopped
4:044	60.0 /4	8-		

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

CC TO K. O Becker, Readyn, 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 74.8	PRODUCTION G.P.M.	TEMPERATURE AIR WATER	REMARKS
4:04 3/4 4:05 4:07 4:08 4:08 4:10 4:11 4:15 5:55 6:00	48.6 - 36.2 $38.1 - 36.7$ $36.0 - 38.8$ $35.8 - 39.0$ $35.8 - 39.0$ $35.8 - 39$ $35.8 - 39$ $35.8 - 39$ $35.8 - 39$ $35.8 - 39$			Started pulling pump Running bailer

-2-

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

4:04 555

D.A. Davis



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.)

321 3" S.W.L. P.W.L. Approx. 82' Production 125-130 g.p.m. Pumped for about an hour. Pumping level constant.

150' of 10" from 0-150. Cemented. Pipe record: 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 Beaorah 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 hasis, a written forecast for continued drilling was given the Mayor as follows:

(Guttenberg) "675-690

Limestone, gray with some darker, perhaps a little shale. Limestone like above, with more green shale. (Sp.Ferry) 690-695 (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."

REA.

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

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." Corl Flic.

- 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 botto
- 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 HGHY

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

K.O.B. Yes, every day.

Mr. T. W. Thorpe 2340 Sixth Avenue Dec Moines, Yowa

Dear Mr. Thorpe:

Frior 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 Beadlyn 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. Horshey

HGH:N

Now far is new location from old well? - 1/4 mi nearest private well to Silurian - Devenian? -

5. 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 and pumped at an approximate rate of 60 g.p.m.

For some time analyses of the water have shown it to be bacteriolog ically 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 now sewage disposal system in town, each house having their own septic tank--with no true "cesspools" being in town though this statement is dcubtful. 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, 1952) 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 dolorites and limestones were cutlines 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 $C-S_2^2-NW-SE-11-91-12$ and at an elevation of about 1035-1038¹.

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-sp ed in getting the gob 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 lo ate 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 everyth ng 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 wich 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 M6Grew, of Whorpe 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 howver.

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.

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 l_{Ξ}^{1} 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'

12-8-41

To: H.G. Hershey

From: D.A. Davis

Subject: Forecast for Readlyn, Bremmer County, Iowa Date: Harch 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 Reading area is covered by Nebraskan, Kansan, and Iowan drifts. The total thickness of the drift at Readlyn is about 80 feet. The Nebrasan 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.

<u>Subsurface Geology</u>. - 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 foot;

	Thick.	From	То
Pleistocene System			
Drift - sandy and gravelly clay possibly with sand and gravel lenses	80	0	80
Silurian System			
Dolomite	120	80	200
Ordo v ician System	:		
Maquoketa formation Brainard member - shale, gray to green, limy layers	120	200	320
Ft. Atkinson member- cherty lime- stone 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	77 0
St. Peter sandstone	45	77 0	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.

-2-

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 off-the projection of horizons between the Oelwein city well in Fayette County and the Waverly city well in western Bremer County.

Water Possibilities

<u>Present Supply</u>.- 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.

<u>Pleistocene</u> <u>rocks</u>.- Some water may be obtained from the s**nads** and gravels in the glacial frift. This cannot be predicted with any certainty, however.

<u>Silurian rocks.</u> 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

-3-

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 LE8 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 Fayelte 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 160 gallons per minute. The static head is 265 feet below the surface. (Column VI, analyses table).

-4-

T.D.	I Readlyn Bremmer County 108	II Arlington Fayette County ~165	III Oelwein Fayette County 120	IV Clermont Fayette County ~195	V Elgin Fayette County ~151
Elev.	1033				1172
Aquifer	Sil.	Sil.	Sil.	Galena	St. Poter
Static level	30				-265
G.P.M.	60		•		100
Draw- down	. •				
Total solids	358	278	* 372 [^]	346	~314
Alk(MeO)	[°] 309	~232	164	~298	⁷ 264
R203	`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	\sim 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
S04	-1,2	[`] 13.8	≥ 57.3	~ 21.4	33.7
HCO3	`377 .0	¹ 283.0	~ 200.1	[™] 363.6	~ 322.1
Calc.	274	~ 225	∿ 223	`321	~ 286

	VI Hawkeye Fayette County	VII Sumner Bremer County	VIII Waverly Bremer County
T.D.	≺83 5	1740	1263
Elev.	·1172	1054	~917
Aquifer	∼St. Peter	Maq., Gal. Oneota	BalPlatt. St. Peter Jordan
Static level	⁻¹ 265	144	· ' 43
G.P.M.	~100	-200	~695
Draw- down			233
Total solids	~445	*259	-377
Alk(MeO)	-270	~240	~ 292
R2 \$ 3	73.0	~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
Ŀ	~ 3.0	1.0	~ 2.0
Cl	-5.0	~ 3.0	∿5.0
S04	~117.1	~36.2	≻65.9
HCO3	- 329.4	<u>`292.8</u>	∽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 Reedlyn City Well	Survey No	. W- <u>154</u>	4
Location SE2 SW2 SE2 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	c Level	34.1	ft.
Pumping Test <u>5</u> Hours <u>4</u> Min; Gal. per min. <u>130</u> Drav	wdown 25.	9_ft. in	min.
Casing Data 150* of 10" from 0 to 150*; 286* 10" of 8" from	134 to	420 110";	1591
of 6" from 649t to 808t perforated in lower 95t			
Description of Formations			
No. Rock Unit	Thick.	$\frac{\text{From}}{(\text{feet})}$	То
PLEISTOCENE SYSTEM			
1. Clay, light yellow and gray mottled, noncalcareous, ve with glacial sand and gravel of quartz and igneous r	ry silty ock		
embedded	15	0	15

2.	Clay, light yellowish brown, calcareous, silty with abundant glacial sand, gravel and pebbles	20	15	3
	The second se			

- Clay, light yellow and medium brownish gray mottled, calcareous, silty, sandy
 10 35
- 4. Clay, medium yellowish brown, calcareous, silty, with 20% to 25% glacial sand and gravel included 30 45
- 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, med	ium-grained,	dense, gran-		
	ular, with 15% chert	, white, dull,	granular to	light gray,		
	vitreous, chalcedoni	c, 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.

No.	Rock Unit	Description	Thick	From	To
7.	Dolomite, very light ular ^{to} medium-gra limestone, light lithographic, and	t yellowish gray, fine-grained, gran- ained saccharoidal with 30% to 45% orange brown, iron stained, sub- d 5% to 15% chert as in 80 to 90 feet	15	90	105
8.	Dolomite, very light in part, fine- to translucent, with Trace yellowish	t yellowish drab and brown, iron stain o medium-grained, dense, granular, sub h traces chert as in 80 to 90 feet. brown residual clay fissure filling 11	ned >		
	to 115 feet		30	105	135
9.	No sample		4	135	139
10.	Dolomite, very ligh in part, fine- to porous, with tra- stained	t gray to yellowish buff, iron stained o medium-grained, dense to saccharoids ce to 5% chert as in 80 to 90 feet, in	l al, ron 20	139	161
ORDO	VICIAN SYSTEM Neda (?) formation				
11.	Shale, light maroon massive, soft, w stained gellowis argillaceous. (hence Neda (?),	stained yellow and green, very calcan ith trace to 15% limestone, light gray h brown, fine- to coarse-grained, sof Note - driller's log gives top of shal at 151 feet)	reous, y t, le, 14	161	175
12.	Limestone, pale to dense, slightly greenish gray, v	light yellow and gray, coarse-grained, argillaceous, with 30% shale, light ery calcareous, slightly silty, soft	, 5	175	180
13.	Shale, light bright red and brown, ca 10% limestone as cretions noinnatian Series Richmond Group Maquoketa formation Brainerd member	green to yellowish green, mottled day alcareous, slightly silty with trace f in 175 to 180 feet. Hematite con-	rk to 20	180	200
14.	Shale, light medium yellowish brown, few traces of ar	greenish gray streaked maroon and in part massive, soft, dolomitic with gillaceous dolomite and limestone	30	200	230
15.	Shale 60%, as in 200 light gray, fine- silty and argills few embedded blas subconchoidal	0+230 feet, with 20% to 25% dolomite, - to medium-grained, granular, dense, aceous. Chert 15% to 20%, light gray, ck specks and dolomite rhombs, dull,	, TO	230	2/0
16.	Shale, varicolored, trace to 10% dolo	calcareous, soft, structureless with omite and limestone, light medium gra	I.Y.	630	equ.
1	fine-grained, ar	gillaceous	25	240	265
17.	No sample		10	265	275

No.	Rock Unit	Description	Thiek .	From	To
18.	Shale, light medium greenish gra massive with 15% limestone, J grained, granular, slightly a silicious siltstone, trace to granular, opaque	y, very calcareous, soft, light medium gray, fine- argillaceous. Chart or 5%, light gray, dull,	40	275	315
	Ft. Atkinson member			•	
19.	Limestone, light drabiah gray, 3 dark gray, coarsely crystall bedded. Shale 20% to 40%, as	fine-grained, with abundan ine fossil fragments em- s in 275 to 315 feet	it . 10	315	3 25
20.	Limostone, light gray and cream dense very argillaceous, few fragments embedded, with 5% siltstone, light buffish-gray granular, subconchoidal, opa	y drab, fine-grained, coarsely crystalline foss to 10% chert or silicified y, few black specks, dull, que	911 1 15	325	340
21.	Limestone, light buff, fine- to dark gray and brown coarsely ments embedded. Chert 30% a 10%, light buff and drab not subvitreous to dull, conchoid	medium-grained with few crystalline, fossil frag- t top grading downward to tled, few black specks, dal to granular	30	340	370
. 1	Clermont member	to			
22.	Shale, light medium greenish and careous, massive, with 35% in light medium drab to gray mo- granular, argillaceous	d bluish gray, very cal- imestone 3704375 feet, ttled black, fine-grained,	20	37 0	390
i	Elgin member	. ,			
23.	Limestone, light to light mediu mottled, fine-grained with c fragments embedded. Dolomit dark brown and gray, fine- t argillaceous, with few thin noncalcareous, nonfissile cl	m drab, gray, and buff carsely crystalline fossil c 10% to 40%, medium to c medium-grained, silty, partings light bluish gray ay	L 7, 30	3 90	420
24.	Linestone, medium to dark brown slightly argillaceous. Dolor 420 feet	ish gray, fine-grained, nite trace, as in 390 to	5	420	425
25. Mo	Dolomite 50% to 70%, medium drai dense, granular, argillaceou 30% to 50%, light to medium o very slightly argillaceous an hawkian series Treated group	bish gray fine-grained, s, calcarcous. Limestone drabish gray, fine-grained nd dolomitic	1, 15	425	440
	Galena formation	1			
20.	fine- to coarse-grained with crystalline crinoid stem frag	orange brown specks embed very abundant coarsely ments embedded	ided, 35	440	475

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No.	Rock Unit /10 Description T	nick	From	To
27.	Limestone, light buff, fine-grained, with fossil frag- ments as in 4404475 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 440-4475 feet, dolomi- tic grading into 15% dolomite light tampy brown fine	2		
	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, du granular, to vitreous, conchoidal, with embedded sponge	ł, 11,		
	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, cal- careous 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, ligh tawny brown, fine medium-grained	t 35	565	600
33.	Limestone, light buff to grayish drab, heavily mottled black, fine- to medium-grained, with coarsely crystallin crinoid and brachiopod fragments and dolomite rhombs embedded. Chert trace to 10%, light drab specked black subvitreous, conchoidal, opaque	ne 30	600	630
34.	Limestone, very light buff, slightly mottled dark gray, very fine-grained, granular, soft, with fossil fragment, embedded as in 600 to 630 feet. Chert trace to 5%, as	8		
	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

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No.	Rock Unit	Description	Thick	From	<u>To</u>
	Guttenberg membe	e de la companya de l La companya de la comp			
37.	Limestone, very li dark gray foss in part, fine- ments of crino bedded, dolomi	ght to light drab, mottled heavily by il fragments and speckled reddish brown grained with coarsely crystalline frag- ids, brachiopods, and ostracodes em- tic in part	15	675	690
Bla	Platteville format Spechts Forry me	ion mber		•	
38.	Shale, light gree massive, soft	n, calcareous, dull, faintly labinated,	5	690	695
	Platteville (undif	ferentiated)	,		
39.	Limestone, light mottled medium grained dense; Shale trace to	to light medium drabish gray and buff, to dark gray by fossils, very fine- trace brown, argillaceous limestone. 10%, light green, pyritic, noncalcareou	۱8,	•	•
	splintery		35	695	730
40.	Linestone as in 6 mottling. Shal flaky, soft; p	95 to 730 feet with much dark gray fossi e trace, light bluish gray, noncalcareou hosphate nodules, trace 735 to 740 feet	1 18, 10	730	740
	Glenwood member				
41. C'	Shale, light medi structureless, phate nodules bazyan series	um grayish green, very slightly calcared soft, with traces of limestone and phos as in 730 to 740 feet	10	740	750
	St. Peter formatio	n			
42.	Sand, white, majo well frosted b by pyrite 750 grad mm. 65%, g	r grade medium, subangular to curvilines y fine pits and grooves, trace cemented to 755 feet. (Average size grade analys -1/8 mm. 25%, 1/8-1/16 mm. 10%)	ı r, :1s; 45	750	795
43.	No sample		2	795	7 97
Beek Pr	mantum series for airie du Chien gre Willow River forme Sand white free	mation ND NDON member Alon member		• ·	
444	25%) with 35% gray, fine-gra	dolomite, pale to medium brownish gray an ined, subsaccharoidal to dense, granular	d , hard	797	80 \$
	Total depth			1 2 1	808