

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

W-0828

RECORD OF WELL

Location:

Town: Mason City (N E)
(S W); County Cerro Gordo
NE-NE-SE sec. 16 T. 96 N., R. 20 W. Mason Twp.

	16	

Well name and number City Well # 11

Owner _____ Address _____

Tenant _____ Address _____

Contractor C. W. Varner Address Dubuque

Drillers R. W. Cridland

Drilling dates Sept. 1938 - Feb. 1939

Well data:

Elevations: Drilling curb 1165.9 feet; Land surface _____ feet

Determined by _____

Topographic position Flat Kansan Upland

Total depth: Reported _____ feet, Measured 1306 feet

Drilling method _____

Hole and casing data 28" to 140'; 19" to 821'; 14" to 1306'

(Give amount, size, kind, and depth of all casing; type and position of seals and packers; cementing; how finished--perforated pipe, screen, gravel pack, open hole, etc.)
140' 20" Cast iron pipe cemented in 28" hole; 14" I.D. Cast
iron liner set from 724 to 782'

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

Original elevation of water level _____ ft.; Source of data _____

Sources of water: Principal Jordan-Oneota; Others _____

Production data:

Date April 11-21, 1939Static depth to water 154.6

Measuring point _____

Pumping level 336' 9"at 1420 g.p.m.340' 5"1490329' 9"1660301' 9"1200Specific capacity _____ g.p.m. per ft. drawdown; Temperature 54 °F.Pump data; Type pump Turbine Column Dia. _____ Length 212Cylinder or bowls: Dia. _____ Length _____ Suction pipe 20Power Electric Motor Airline _____

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

Use of water City Supply

WATER ANALYSES (in parts per million)

Date sampled	<u>Feb. 24, 1939</u> [*]	<u>April 12, 1939</u> ⁺	<u>Nov. 24, 1939</u> ^x	
Sampled by	<u>C.B. Datchen</u>	<u>H.G. Hershey</u>	<u>H.G.H.</u>	
Total solids	<u>471</u>	<u>562</u>	<u>430</u>	
Insoluble matter	<u>26.5</u>	<u>16.8</u>	<u>9.0</u>	
Alkalinity (Meo)	<u>316.0</u>	<u>398.0</u>	<u>390.0</u>	
Alkalinity (Phn)	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	
pH	<u>7.6</u>	<u>7.3</u>	<u>7.0</u>	
Fe ₂ O ₃ + Mn ₂ O ₃ + Al ₂ O ₃	<u>6.5</u>	<u>5.2</u>	<u>1.5</u>	
Alkali as sodium	<u>35.0</u>	<u>32.9</u>	<u>22.4</u>	
Calcium	<u>78.6</u>	<u>92.0</u>	<u>105.1</u>	
Magnesium	<u>40.0</u>	<u>38.1</u>	<u>38.6</u>	
Iron (unfiltered)	<u>0.1</u>	<u>1.2</u>	<u>0.2</u>	
Manganese	<u>Tr.</u>	<u>Tr.</u>	<u>0.00</u>	
Nitrate	<u>3.5</u> <u>2.80</u>	<u>0.00</u>	<u>0.00</u>	
Fluoride	<u>1.2</u>	<u>1.00</u>	<u>1.2</u>	
Chloride	<u>16.0</u>	<u>11.0</u>	<u>12.0</u>	
Sulfate	<u>102.7</u>	<u>46.0</u>	<u>35.0</u>	
Bicarbonate	<u>385.5</u>	<u>485.6</u>	<u>473.8</u>	
Hardness (ppm)	<u>361</u>	<u>389</u>	<u>422</u>	
Hardness (gpg)	<u>21.1</u>	<u>22.7†</u>	<u>24.7</u>	
Remarks	<u>* St. Peter x Jordan-Oneota</u>			

Laboratory data:

Sample storage location _____

Sample range _____ No. spls. _____ No. dupls. & cond. _____

Spls. prepared by _____ Washed range _____ by _____

Driller's log and cond. _____

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

Microscopic study _____ strip log _____

Gen. log _____ Correl. by _____

7-26-69
R P 11-11-70

STATE				COUNTY				LATITUDE				LONGITUDE				SEQ. NO.		
								DEG	MIN	SEC	N or S	DEG	MIN	SEC.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	9	1	7	4	3	0	7	5	4	N	0	9	3	1	2	0	5	1

US GEOLOGICAL SURVEY

IOWA DISTRICT WRD

WELL NO 096-20 W-16 DAA CO CERRILLO GORDON
OWNER CITY WELL #11 ADDRESS MASON CITY
DRILLER VARNER DATE DRLD 1939
MAP _____
SOURCE OF DATA FILE
DESCRIPTION M. P. LSD FEET (ABOVE)
(BELOW) LSD

CONTINUED FROM ABOVE	ACCURACY	LOCAL WELL NUMBER													LOCAL USE										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	CLASS OF DATA																							
		T	R	E _w	SEC.	QUARTERS	W-NUMBER	OPTIONAL																																																				
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	0	9	6	2	0	W	1	6	D	A	A				0	0	8	2	8	/	3	9	C	I	T	Y				1	1	M	A	S	O	N				C	I	T	Y				M	P	W	I	F				C	I			G	A

[illegible][illegible]

(1220)

CODED BY Heptum SD DATE 12-20-75

140' 20" CAST IRON PIPE
CEMENTED IN 28" HOLE

14" I.D. CI PIPE 915-821'

10" PIPE 7.5 TO 931' 8"

CEMENTED LOWER 25'

PUNCHED BY KH-Davis DATE 1-2-73

VERIFIED BY _____ DATE _____

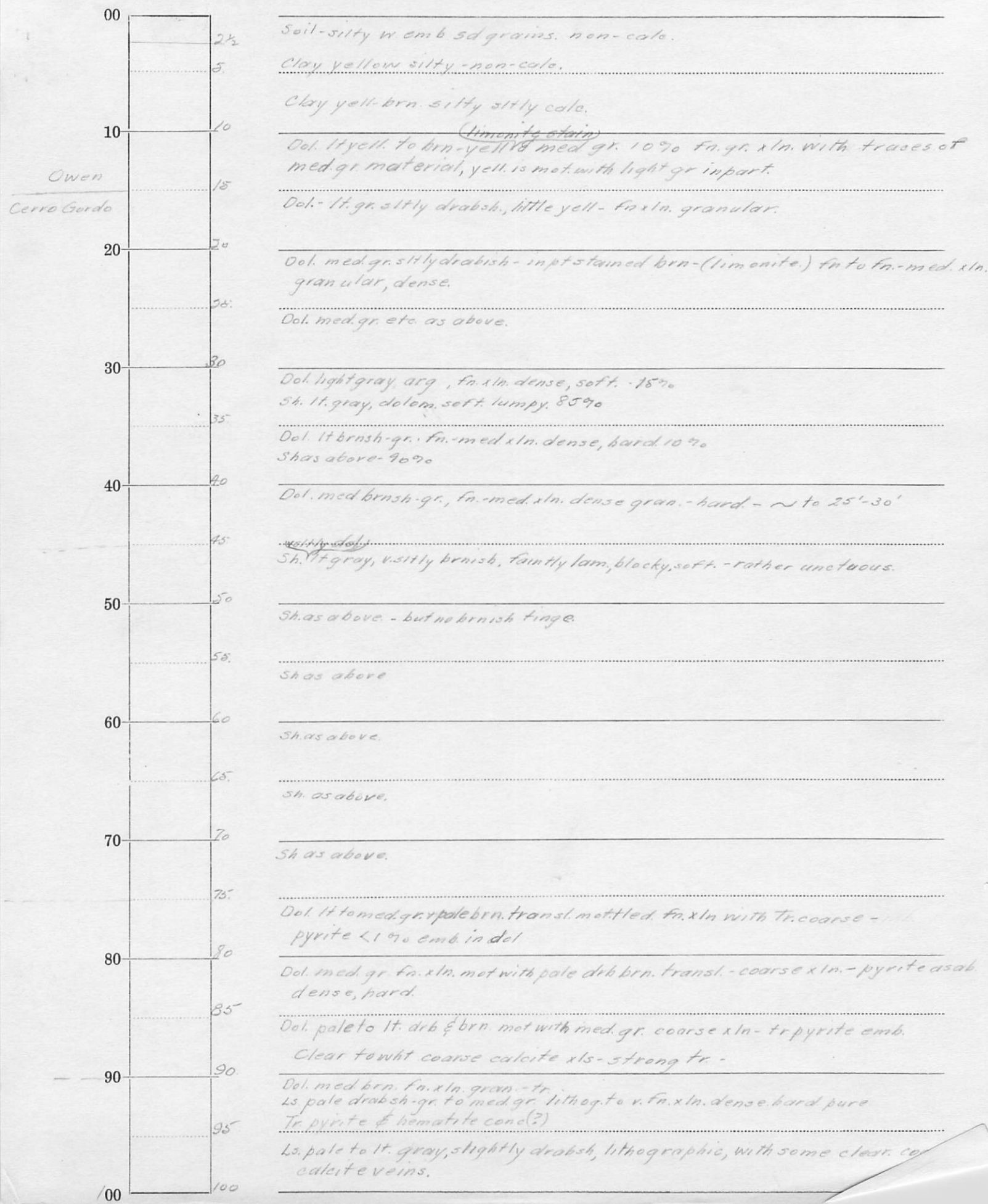
SKETCH ON REVERSE: YES _____ NO _____

16

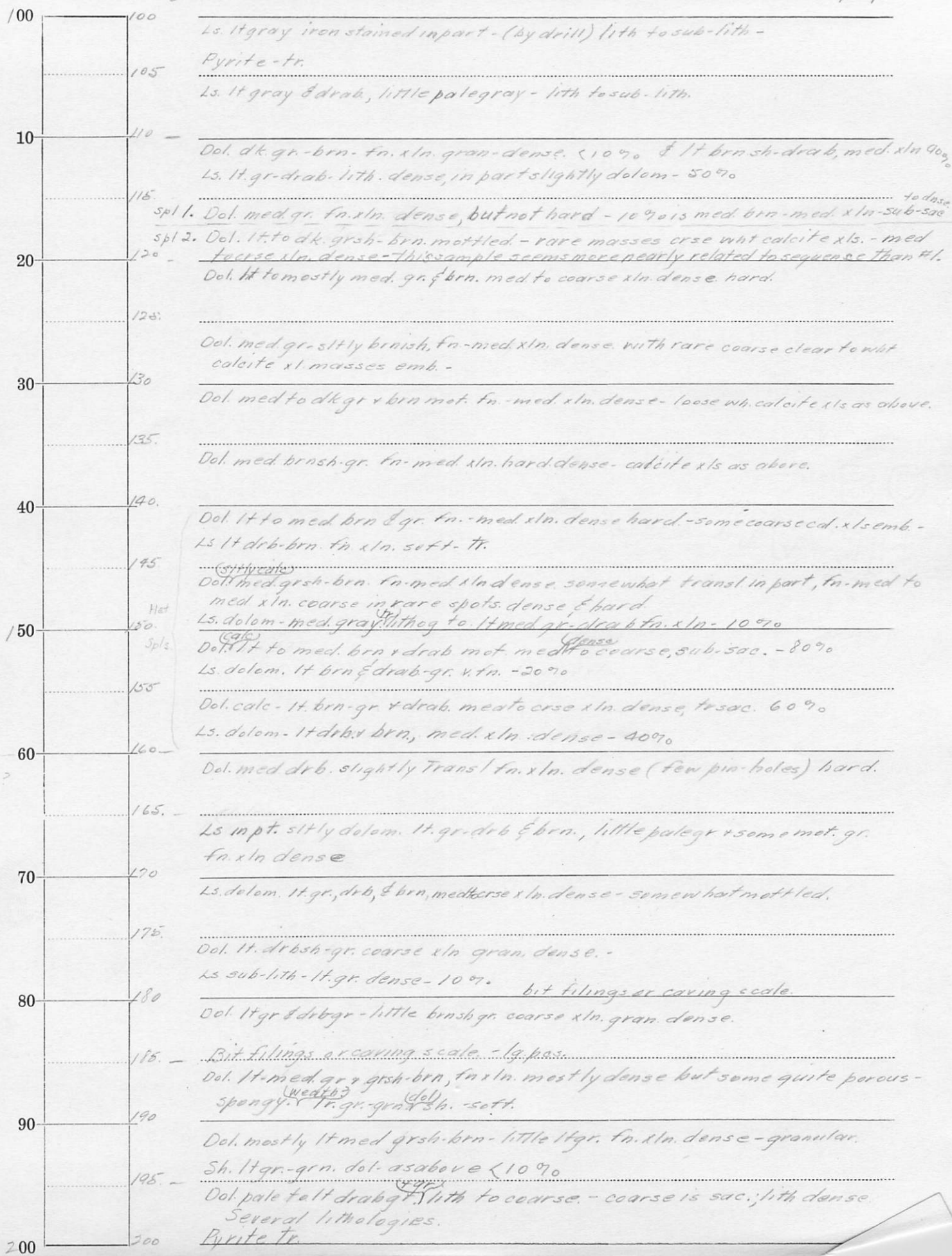
WELL NO. 296-20W-16DHA

Sheet No. 1 Name of Well City Well No. 11 Survey No. W. 2828

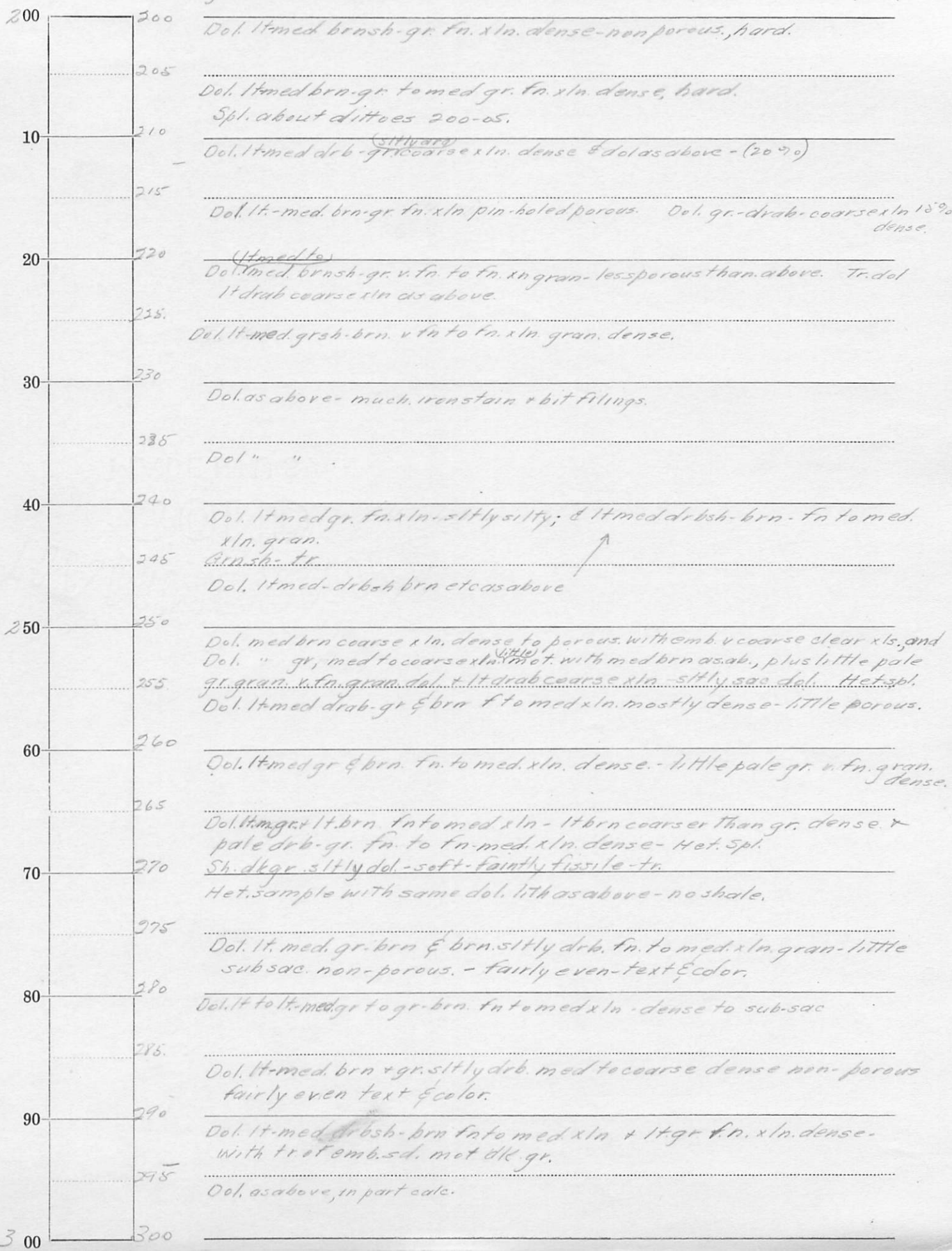
Location Mason City - Cerro Gordo Co. Date Drilled Analyst Carrier 1/28/02



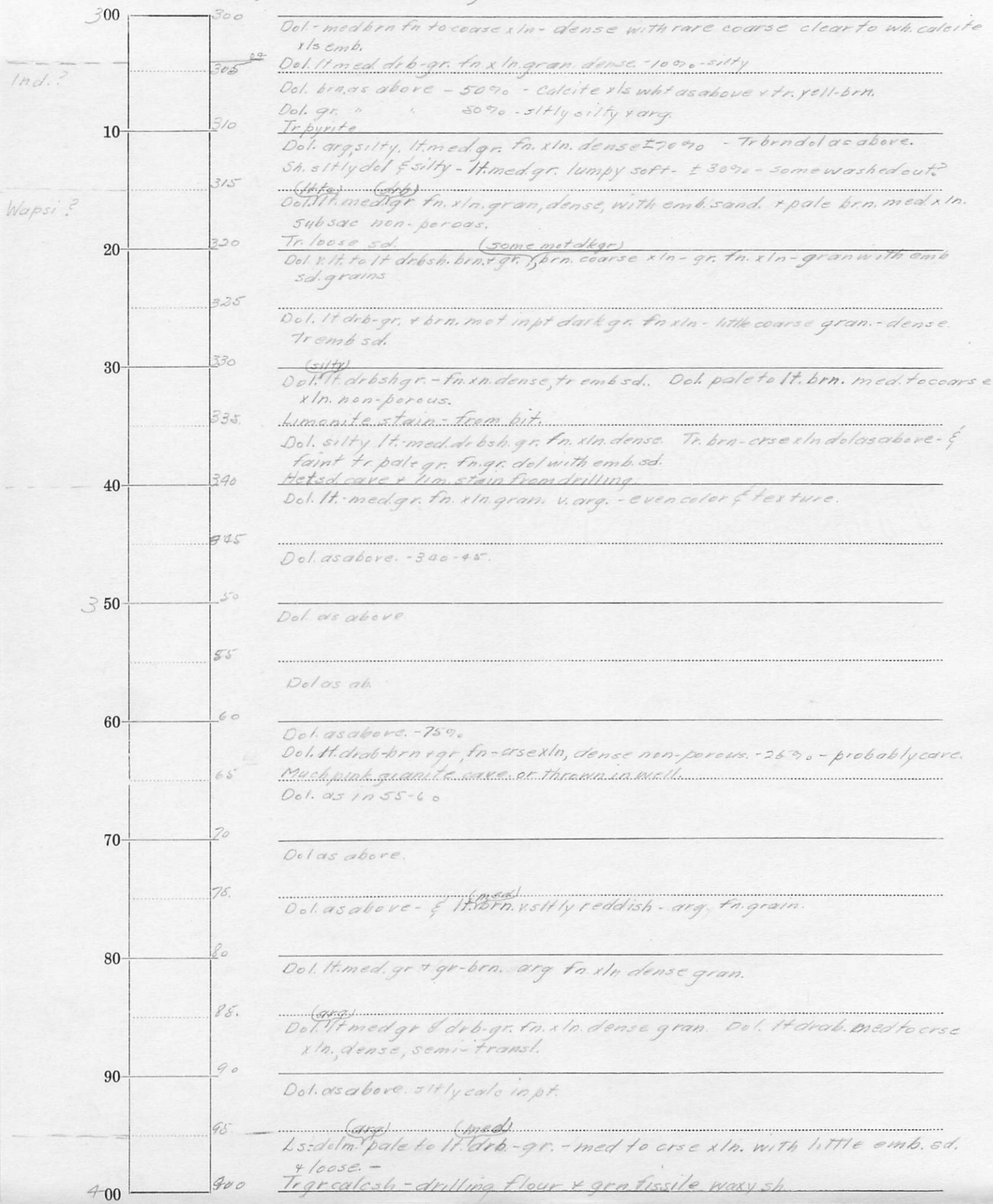
Location Mason City - Cerro Gordo Date Drilled Analyst Carrier 1/29/72



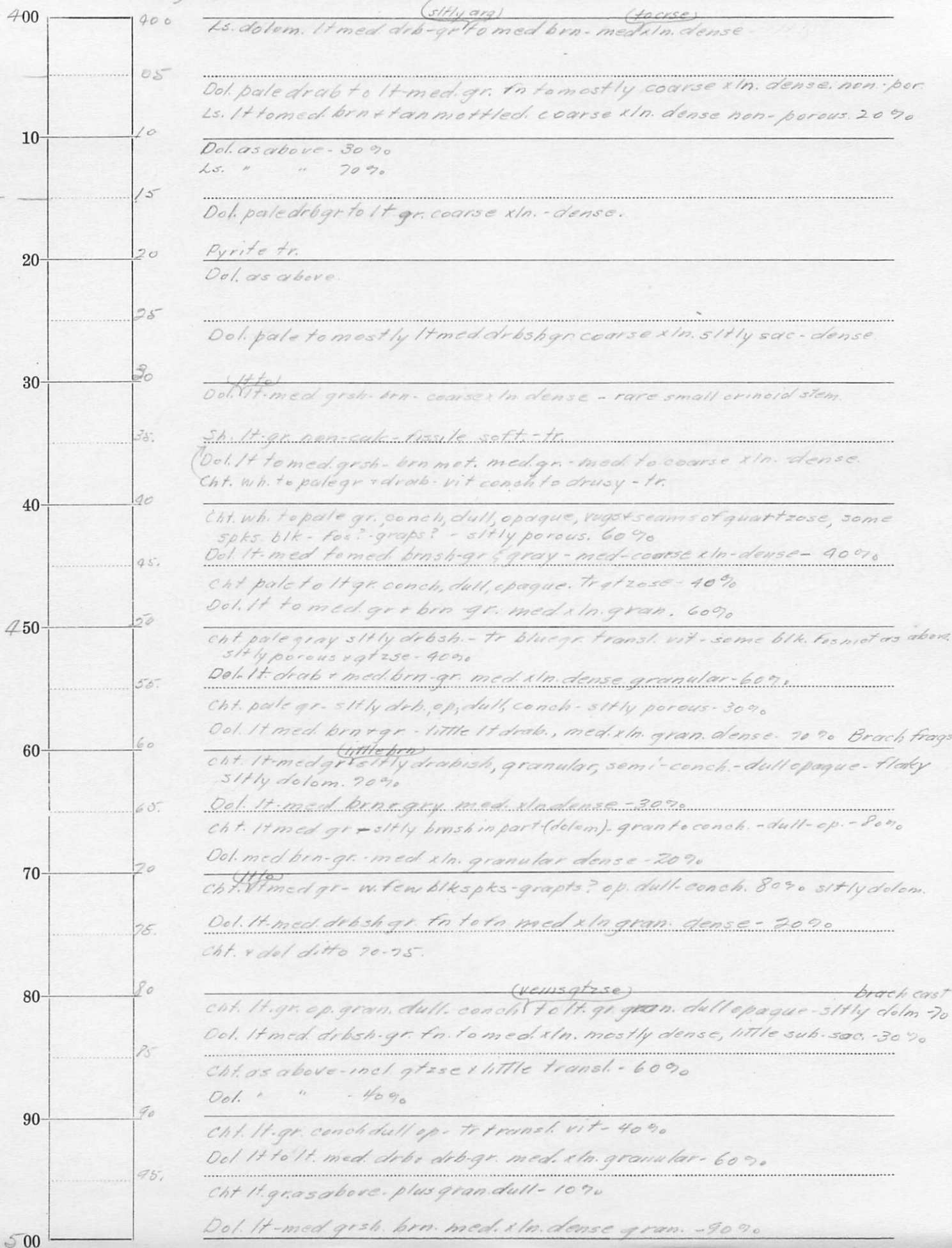
Location Mason City - Cerro Gordo Date Drilled Analyst Carrier 1/29/02



Location Mason City - (Cerro Gordo) Date Drilled Analyst Carrier 1/30/42



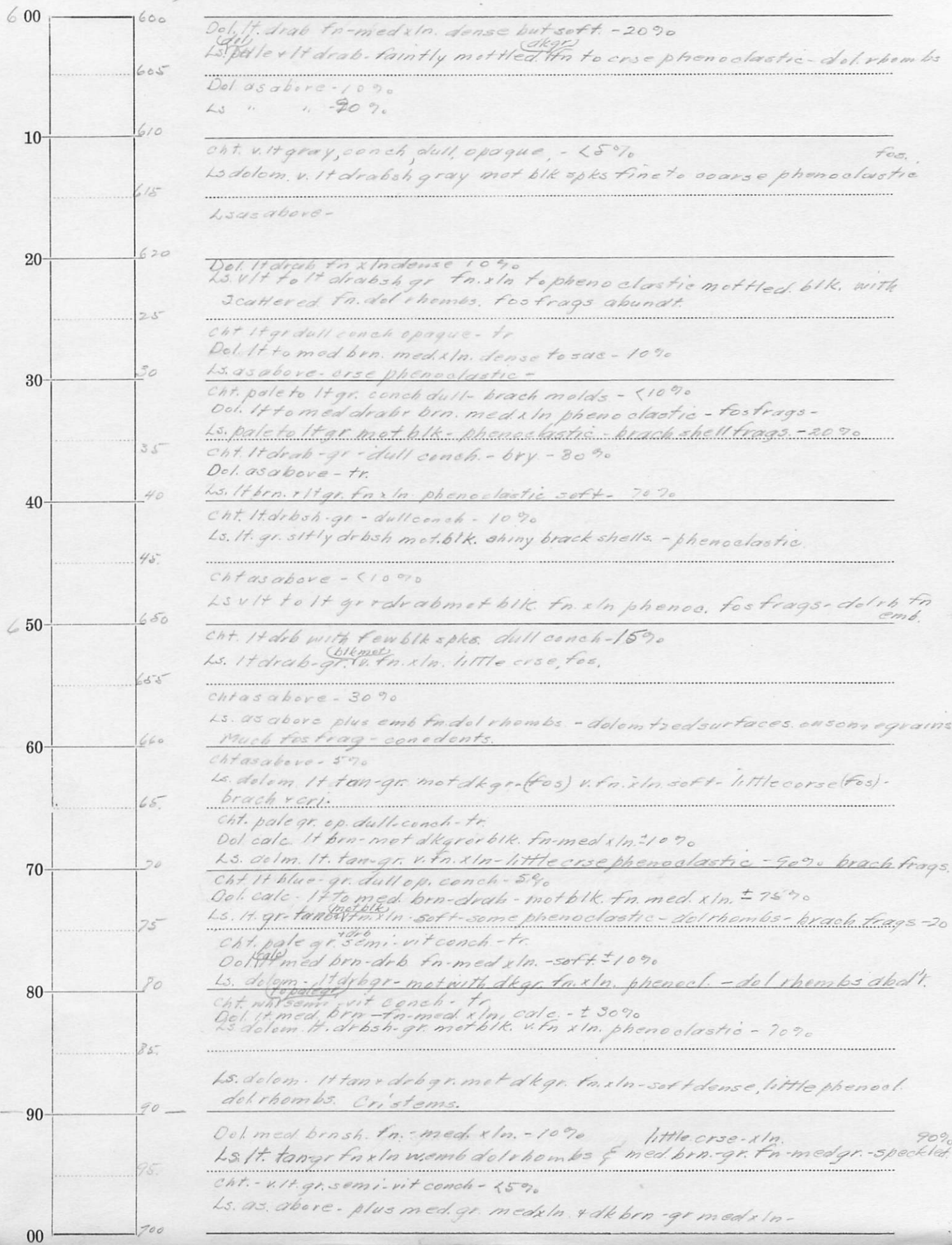
Location Mason City (Cerro Gordo Co.) Date Drilled Analyst Carrier 1/30/92



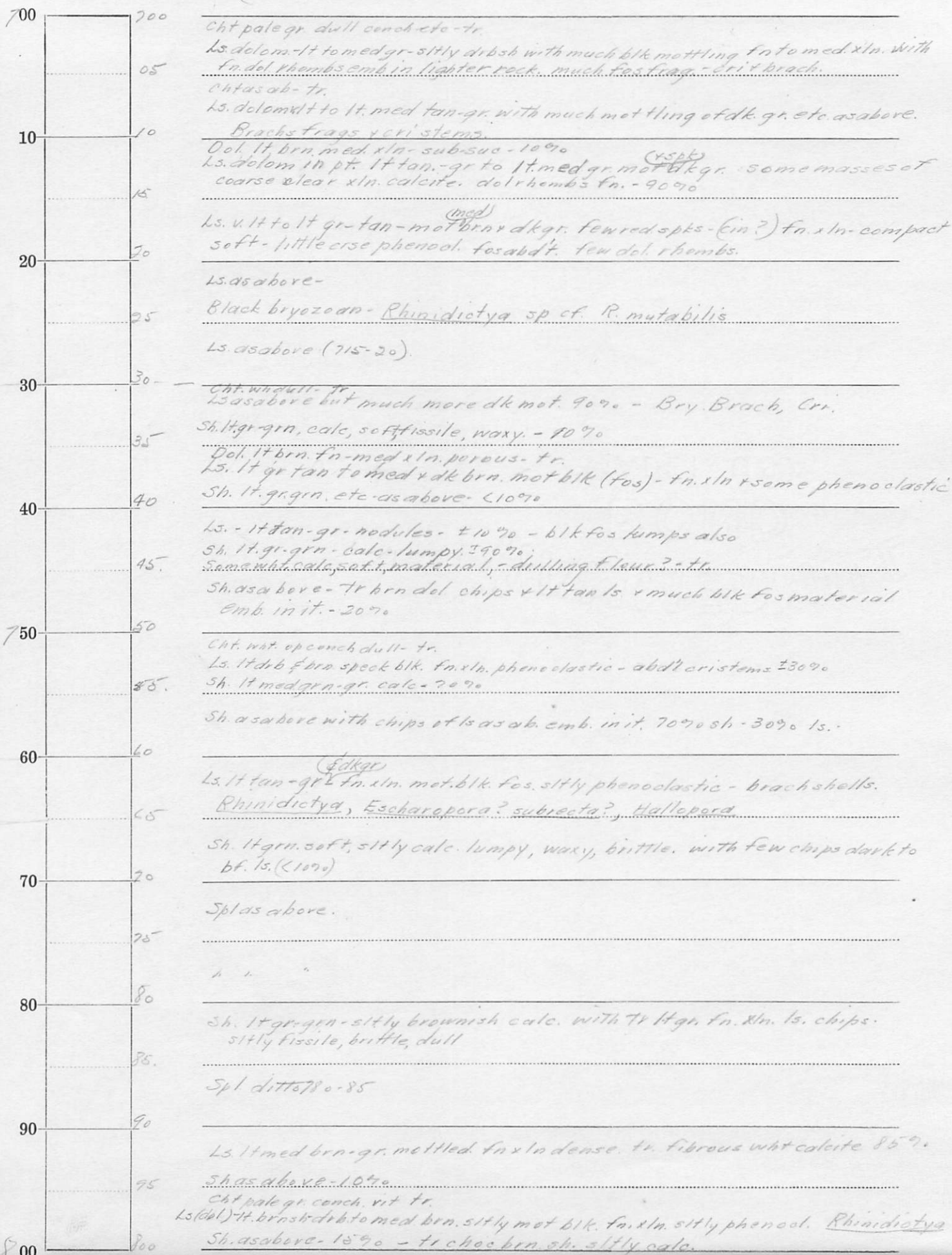
Location Mason City (Cerro Gordo Co.) Date Drilled Analyst Carrier 1/21/42

500	500	cht as above - tr
		Dol. lt. med. drb. gr. med. xln. dense - to sub-sac -
	505	Sh. dk. gr. calc. - blocky - tr.
		Dol. lt. drab. med. to coarse dense, soft
10	510	cht. lt. gray, gran, sub-conch, dull, - silty gtzse - 20%
		Dol. lt. med brn & gr. med to coarse xln. dense - gran - 80%
	515	cht as above - tr
		Dol. lt. to med. brn. med to coarse xln - tr fn. - dense
20	520	Ls. lt. brn - med gr. fn. xln - dense - 80%
		Dol. lt. med drb. brn. med xln. dense to sub-sac - not porous - 30%
		Ls. lt. & lt. med bf. gr. fn. xln dense soft, fos (brach.) 70%
	525	Dol. med brn. med. xln. gran - dense - 20%
		Ls. lt. bf. gr. med. gr. & drb. - fn. xln. phenoclastic - 80%
30	530	fn. dol. & bombs - rare.
		Ls. as above.
	535	
		Ls. as above - silty dol.
40	540	
		Ls. as above - tr. cin. spks (or lim stain?)
	545	
		Dol. lt. brn. fn. to med. xln. tr.
		Ls. silty dol. in part lt. bf. gr. etc as above.
50	550	Ls. silty dol., lt. bf. gr. phenoclastic, fn. xln. soft. lim stain or cin spks.
		Cri stems.
	555	Dol. lt. brn. med xln. subsac - 20%
		Ls. pale to lt. gr. drb. fn. xln. silty phenoclastic - emb. dol. rhombs.
		cri stem
60	560	
		Ls. as above.
	565	
		Ls. as above - some slightly darker gray.
70	570	
		Dol. lt. brn. coarse xln. tr.
		Ls. pale to lt. gr. drab. & gray. - fn. to coarse phenoclastic. - dol. rhombs emb.
	575	
		Dol. lt. drab, silty med. blk, med to coarse xln. dense 20%
		Ls. as above - 80%
80	580	
		Dol. as above 25%
		Ls. " " 75% - dol. rhombs.
	585	
		Dol. as above - 50%
		Ls. " " 50%
90	590	
		Dol. lt. drb. - med xln. non-porous - 70%
		Ls. dolom. lt. drb. sh. gr. fn. xln with emb. dol. rhombs.
	595	
		Dol. lt. brn med-coarse xln. soft - 30%
		Ls. dolom lt. drb-gr. fn. to med xln. w. emb. dol. rhombs.
600	600	

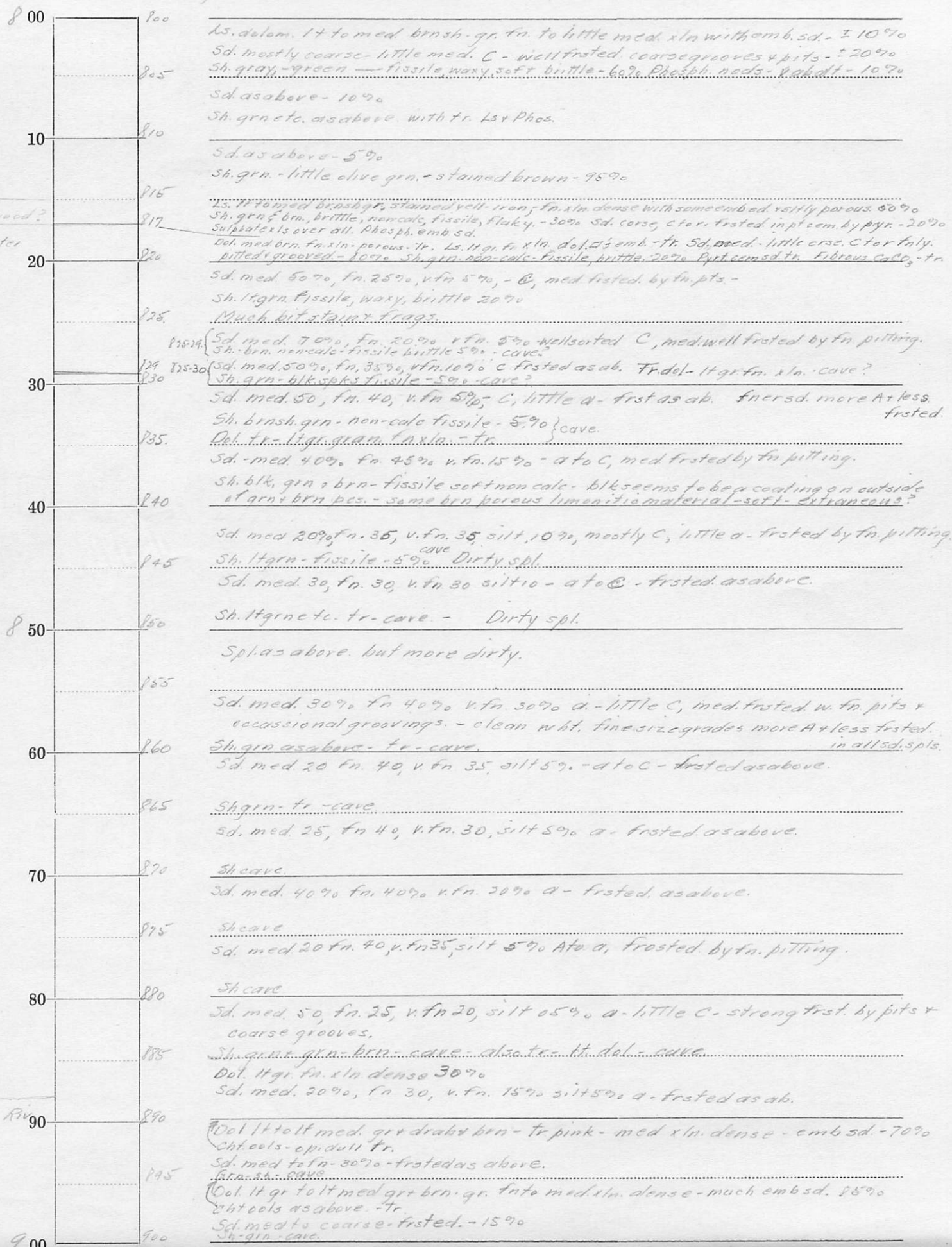
Location Mason City (Carra Gordo Co.) Date Drilled Analyst Carrier 7-11-42



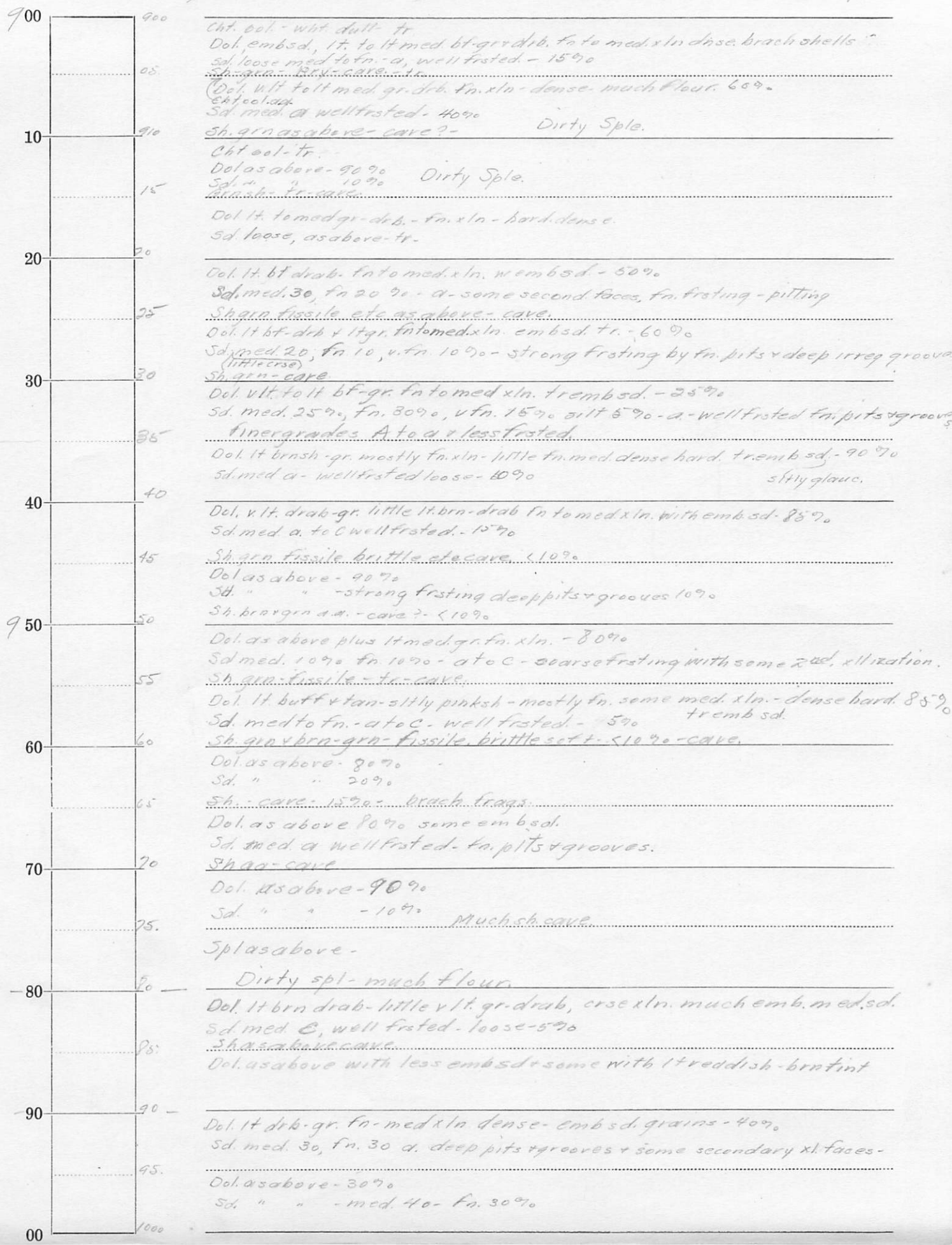
Location Mason City (Cerra Gorda) Date Drilled Analyst Carrier 2-11-42



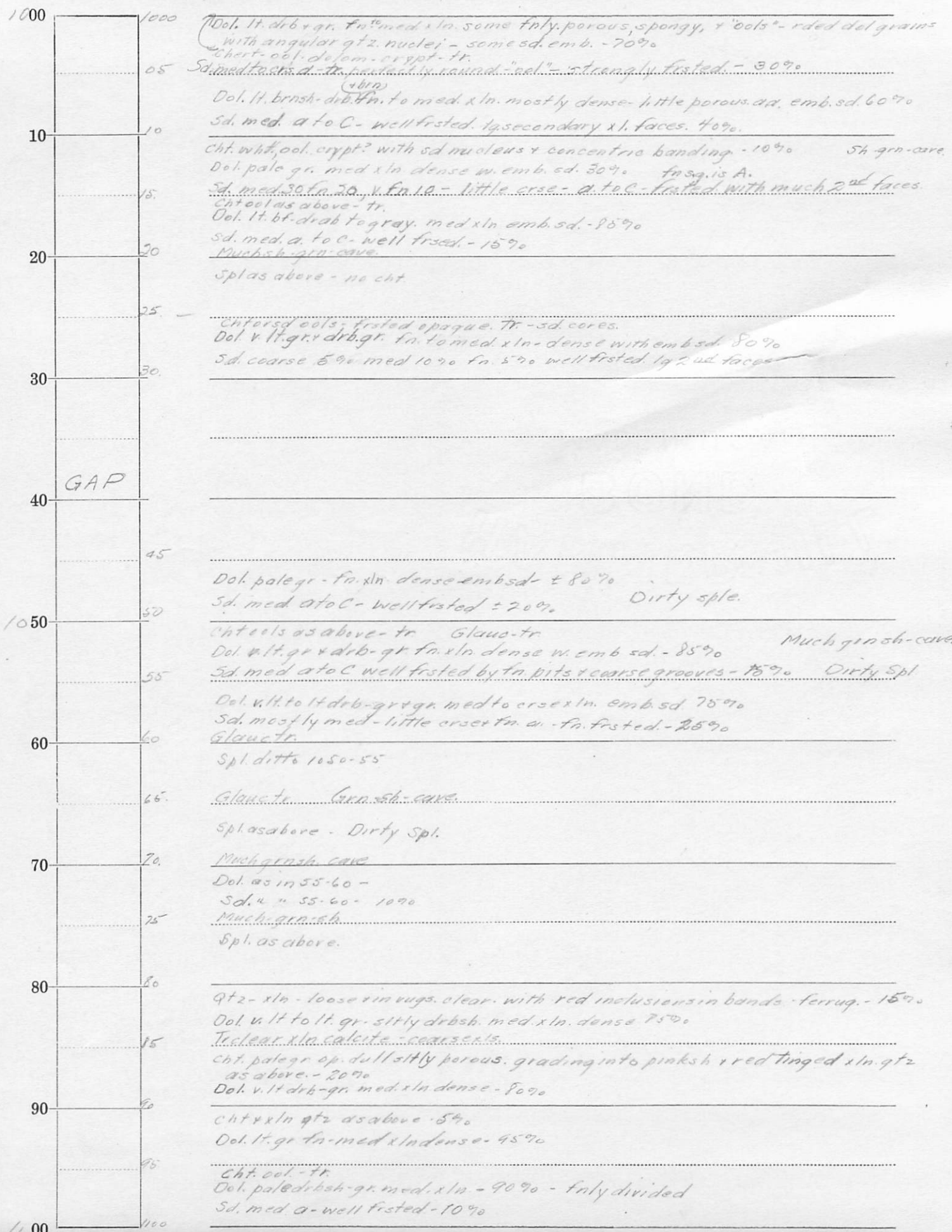
Location Mason City (Carro Guard) Date Drilled Analyst Carrier 2/11/42

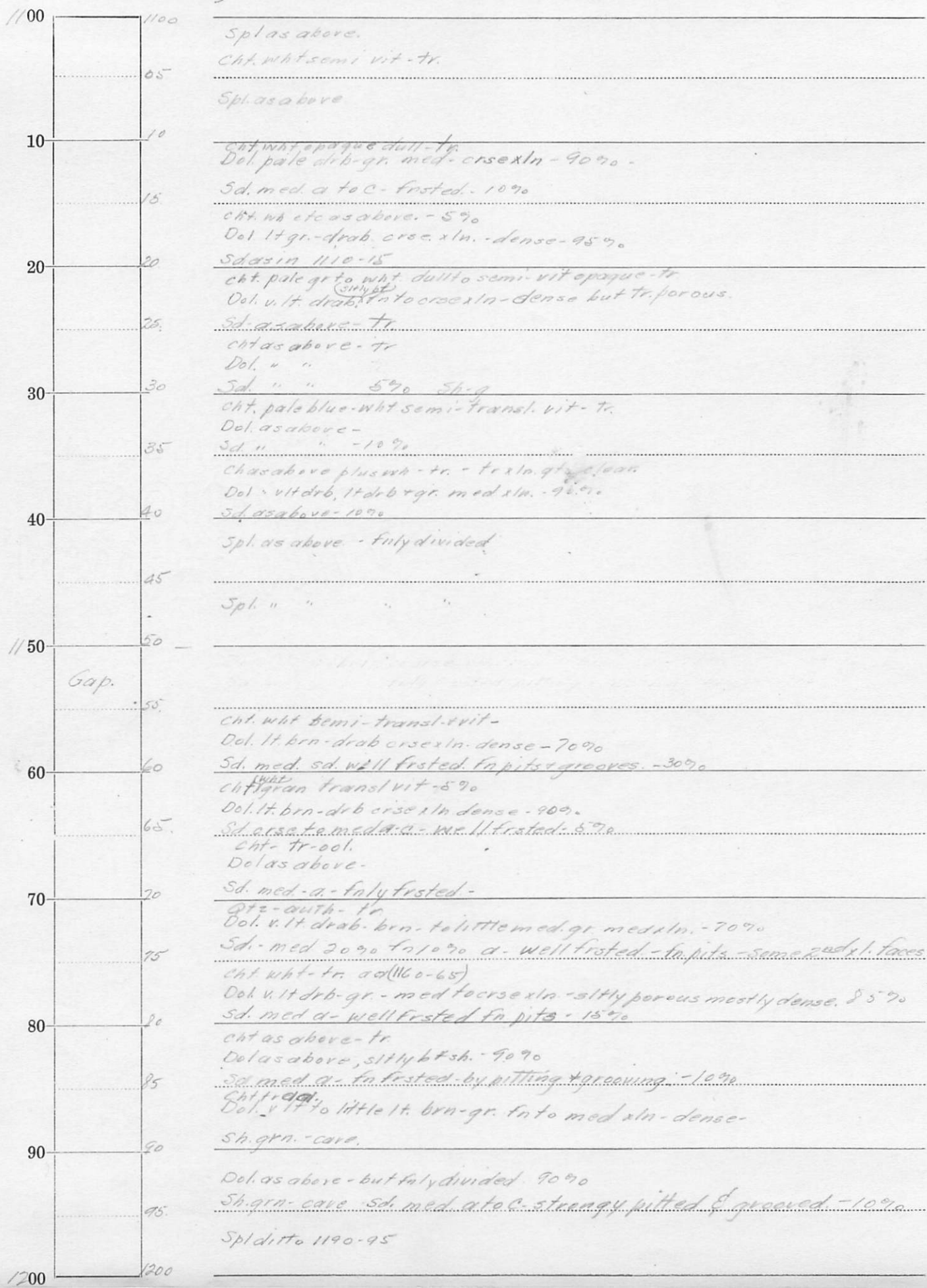


Location Mason City (Cerro Gordo Co.) Date Drilled Analyst. Carter 2/12/42

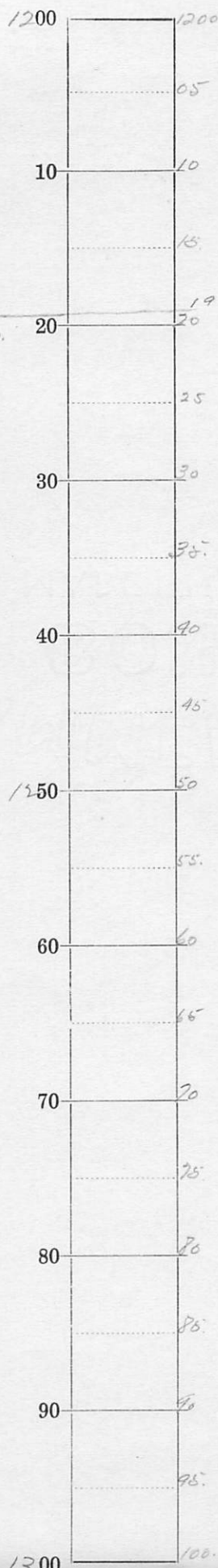


Location Mason City (Cerro Gordo) Date Drilled Analyst Carrier 2/13/92





Location Masan City (Cerro Gordo) Date Drilled Analyst Carrier 2/13/42



Dol. v. lt. bf. tan-gr. - fn to med x ln - dense

Sd. med. a to c well frsted - 10% - cave also greenish-cave.

Spl. ditto 1200-05. - Dirty spl.

Spl. " 1205-10 - " "

Dol. v. lt gr. drb. x drb-brn. fn to med x ln - dense with med emb
Sd. grains in small part.

Sd. coarse a to c fnly pitted - Tr.

Sd. wht except for bit stain - coarse to v coarse a to c - deeply
pitted & grooved - much frsted. well sorted.

Sd. v. coarse - tr, coarse 20%, med. 55% fn 10% vfn 10% silt 5% - a to c - finer
size grades. A not well frsted

Sd. crse - 20%, med 65%, fn 10%, vfn 5% - as above. (a to c etc)

Sd. coarse - 15% med. 75% fn 5% vfn 5% - a to c etc as above.

Sd. v. coarse 5% coarse 15% med. 40% fn 35% vfn 5% - frsting
and shape as above.

Sd. v. coarse 5% coarse 15% med 50% fn 20 vfn 10% frst & shp as above

Sd. v. crse - tr, crse 10%, med 30%, fn 30%, vfn 30% shaper frst as above.

Sd. v. crse 5% crse 10%, med 40%, fn 25%, vfn 20%

Dol. v. lt drab m. x ln - dense - tr - cave?

Sd. v. crse tr, med 40%, fn 40 v. fn 20 shp frst as above.

Sd. v. crse v. crse tr, med. 25% fn 35% v. fn 40% shp frst as above.

Sd. coarse - 5%, med 30%, fn 30% v. fn 35% as above.

Sd. crse tr - med 35%, fn 25%, v. fn 40 - to pyrt. com. med. v. dol. com. sd
cave?

Sd. crse tr - med 25, fn 25, vfn 40, silt 10 - shp frst. as above.

Dol. lt gr fn x ln - dense - com. sd tr - cave?

Sd. crse tr, med 40, fn 20 v. fn 30 silt 10%

Dol. lt drb x gr. fn x ln with emb. sd. grains - 20% - cave?

Sd. crse tr med 20%, fn. x vfn 35% - shp frst as above.

Sd. (green calc) sh. green with emb. sd. & blk. for fng. & plus neds - 25% - cave?

Dol. v. sh as above - 10% each.

Sd. v. crse tr coarse 5% med 40% fn 10 vfn 15, silt 10 shp frst as above.

Sheet No. 14 Name of Well City Well No. 11 Survey No. W0828

Location Mason City (Cerro Gordo) Date Drilled Analyst Carrier 2/12/42

1300	1300	Dot. lt gr. fn. xln dense - 5 - 40% - Dirty spl.
	1305	Sd. med 20, fn 20%, v. fn 20% - at mostly c. well frosted coarse pits & grooves. Sh. brn - silty greenish 40% fissile brittle non-calc
10		
20		
30		
40		
50		
60		
70		
80		
90		
00		

Varner Well Drilling Company

INCORPORATED

905 Dubuque Bldg.

Telephone 3691

DUBUQUE, IOWA,

July 23, 1941

Iowa Geological Survey,
Iowa City, Iowa.

Gentlemen:

Enclosed you will find copy of record of well which we drilled for the city of Mason City, Iowa.

We are sorry we have been so long in sending this record to you but our records were not completed on this well until recently.

Yours very truly,

VARNER WELL DRILLING CO. INC.,

BY Harry Lewis

HL:FW
Encl.

CITY OF MASON CITY
PWA Docket Iowa 1366-F
Well

<u>Date</u>	<u>Thickness</u>	<u>From</u>	<u>To</u>	<u>Driller's Description</u>	<u>Static Level</u>	<u>Driller</u>
9-19-38	2.5	0	2.5	Black loam		Quinn
	2.5	2.5	5	Yellow clay		Quinn
9-26-38	4	5	9	Yellow clay		Quinn
	7	9	16	Yellow clay & broken lime		Quinn
9-27-38	1	16	17	Yellow clay		Quinn
	7	17	24	Blue limey shell rock		Quinn
	2	24	26	Blue soft limey rock		Quinn
9-28-38	4	26	30	Broken lime stone		Cridland
	16	30	46	Blue shale		Cridland
	7	46	53	Blue clay	Enough water to drill with	Quinn
	19	53	72	Blue clay, turning grey	"	Quinn
9-29-38	3	72	75	Blue shale	14	Cridland
	3	75	78	Line stone	14	Cridland
	3	78	81	Blue lime rock	12	Quinn
9-30-38	3	81	84			Cridland
	7	84	91	Blue lime	12	Quinn
10-3-38	4	91	95	Blue lime stone	14	Cridland
	6	95	101	Blue lime stone	14	Quinn
10-4-38	2	101	103	Blue lime stone	14	Cridland
	2	103	105	Blue & grey lime	14	Cridland
	1	105	106	Grey lime	14	Cridland
	5	106	111	Grey lime stone	14	Quinn
10-5-38	2	111	113	Hard grey lime	14	Cridland
	2	113	115	Grey lime	14	Cridland
10-7-38	3	115	118	Grey lime rock	14	Quinn
10-10-38	2	118	120	Brown lime, some grey	14	Quinn
	1	120	121	Brownish grey lime	14	Quinn
Delayed - Hole 8" out of plumb - reamed out.						
11-27-38	2	121	123	Lime rock		Quinn
	12	123	135	Hard grey lime		
	5	135	140	Blue lime		
End 28" Hole - Start 19" Hole.						
12-7-38	3	140	143	Hard lime		Cridland
12-8-38	2	143	145	Hard lime		Cridland
	8	145	153	Grey limestone		Erickson

12-9-38	13	153	166	Grey limestone	14	Nuss
	7	166	173	Lime, grey		Cridland
	2	173	175	Hard blue lime		Cridland
	3	175	178	Grey limestone	14	Erickson
	6	178	184	Grey limestone, hard	14	Erickson
12-10-38	11	184	195	Grey limestone	14	Nuss
	5	195	200	Broken lime	14	Cridland
	3	200	203			Erickson
12-12-38	1	203	204	Broken lime, small amt cavings	14	Nuss
	1	204	205	Lime, very hard	14	Nuss
	5	205	210	Lime, medium hard	14	Nuss
	1	210	211	Lime, hard	14	Nuss
	4	211	215	Grey lime	14	Cridland
	2	215	217	Grey lime	14	Erickson
	6	217	223	Grey lime	14	Nuss
12-13-38	2	223	225	Grey lime, hard	14	Nuss
	7	225	232	Hard grey lime	14	Cridland
	8	232	240	Grey limestone, medium hard	14	Erickson
	2	240	242	Broken lime	14	Nuss
12-14-38	6	242	248	Lime, medium hard	14	Nuss
	3	248	251	Lime & green shale	14	Nuss
	3	251	254	Broken lime with shale	14	Cridland
	2	254	256	Hard brown lime	14	Cridland
	3	256	259	Brown lime stone	14	Cridland
	2	259	261	Brown limestone	14	Erickson
	9	261	270	Brown limestone, some shale	14	Erickson
	3	270	273	Brown lime, medium hard	14	Nuss
	4	273	277	Brown lime, hard	14	Nuss
12-15-38	3	277	280	Brown lime, medium hard	14	Nuss
	10	280	290	Brown lime and shale	14	Cridland
	4	290	294	Brown lime and shale	14	Erickson
	2	294	296	Brown lime, very hard		Erickson
	1	296	297	Brown lime and shale		Erickson
	4	297	301	Brown lime, hard	14	Nuss
	5	301	306	Brown lime, medium hard		Nuss
12-16-38	3	306	309	Blue and brown lime	14	Cridland
	2	309	311	Blue lime stone		Cridland
	5	311	316	Blue shale	14	Erickson
	4	316	320	Blue lime and shale		Erickson

12-19-38	15	320	330	Lime & shale, grey	14	Nuss
Hole found to be 5 feet long.						
12-19-38	6	335	341	Lime & blue shale		Cridland
	2	341	343	Lime & shale		Cridland
	6	343	349	Blue limestone		Erickson
	3	349	352	Grey limestone		Erickson
12-20-38	2	352	354	Grey lime	14	Nuss
	7	354	361	Blue grey lime	14	Nuss
	2	361	363			Cridland
	5	363	368	Limestone grey & blue		Cridland
	2	368	370	Broken lime		Cridland
	2	370	372	Grey limestone, very hard	14	Erickson
	6	372	378	Grey limestone	14	Erickson
12-21-38	6	378	384	Grey lime, hard	14	Nuss
	4	384	388	Hard light grey lime	14	Cridland
	4	388	392	Light grey limestone, hard	14	Erickson
	2	392	394		14	Erickson
12-22-38	6	394	400	Hard grey lime	14	Nuss
	3	400	403	Hard light grey lime	14	Cridland
	2	403	405	Grey lime	14	Cridland

Hole measured in 405.

CITY OF MASON CITY
PWA Docket Iowa 1366-F
Well

<u>Date</u>	<u>Thickness</u>	<u>From</u>	<u>To</u>	<u>Driller's Description</u>	<u>Static Level</u>	<u>Driller</u>
12-22-38	4	405	409	Grey Lime, very hard	14	Erickson
12-23-38	6	409	415	Grey Lime, Hard	14	Erickson
	2	415	417	Light Grey Lime	14	Cridland
	4	417	421	Hard Lime	14	Cridland
	7	421	428	Hard Grey Lime	14	Nuss
12-27-38	1	428	429	Lime & Shale	14	Nuss
	2	429	431	Grey Lime & Shale	14	Nuss
	3	431	434	Grey Lime	14	Nuss
	2	434	436	Hard Grey Lime	14	Nuss
	6	436	442	Hard Light Lime	14	Cridland
	2	442	444	Hard Grey Lime	14	Erickson
	3	444	447	Grey Limestone	14	Erickson
	3	447	450	Grey Lime	14	Erickson
12-28-38	10	451	461	Grey Lime	14	Nuss
	13	461	474	Light Grey Lime	14	Cridland
	9	474	483	Grey Limestone	14	Erickson
	3	483	486	Grey Lime, Getting Harder	14	Erickson
12-29-38	8	486	494	Grey Lime, Medium Hard	14	Nuss
	8	494	502	Hard Grey Limestone	14	Cridland
	3	502	505	Grey Lime, Medium Hard	14	Erickson
	4	505	509	Brown Lime	14	Erickson
12-30-38	2	509	511	Hard Brown Lime	14	Nuss
	4	511	515	Very Hard Brown Lime	14	Nuss
	1	515	516	Hard Brown Lime	14	Cridland
				Put on new sand line		
	4	516	520	Hard Brown Lime	14	Cridland
	5	520	525	Brown Lime, Very Hard	14	Erickson
12-31-38	3	525	528	Brown Lime, Very Hard	14	Erickson
	5	528	533	Brown Lime, Very Hard	14	Nuss
1-2-39	3	533	536	Brown Lime, Very fine & hard	14	Nuss
	2	536	538	Hard Brown Lime		Cridland
1-3-39	5	538	543	Hard Brown Lime	14	Nuss
	2	543	545	Hard Brown Lime		Cridland
1-4-39				Took down 14" Bailer, put up 6" Bailer.		

1-6-39	3	545	548	Grey Lime, Very Hard	14	Erickson
	3	548	551	Hard Brown Lime	14	Cridland
	1	451	452	Grey Limestone, very hard	14	Newell
	2	452	454	Grey Lime, very hard	14	Newell
1-7-39	3	554	557	Grey Lime, Hard	14	Erickson
	1	558	559	Broke stem on lower square	14	Cridland
1-9-39	1	559	560	Grey Lime, Hard	14	Erickson
	1	560	561	Hard Lime		Cridland
	3	561	564	Hard Grey Lime		Cridland
	4	564	568	Hard Grey Lime	14	Newell
1-10-39	4	568	572	Grey Lime, Hard	14	Erickson
	5	572	577	Grey Lime		Cridland
	5	577	582	Light Grey Lime	14	Newell
1-11-39	6	582	588	Grey Lime	14	Erickson
	7	588	565	Grey Lime	14	Cridland
	5	595	600	Grey Lime, Hard	14	Newell
1-12-39	2	600	602	Grey Lime, Hard	14	Erickson
	1	602	603	Grey Lime	14	Erickson
	7	603	610	Grey Limestone	14	Cridland
	6	610	616	Grey Limestone	14	Newell
	1	616	617	Grey Lime	14	Newell
1-13-39	1	617	618	Grey Lime	14	Erickson
	7	618	625	Grey Lime	29	Cridland
	7	625	632	Grey Limestone	75	Newell
1-16-39	5	632	637	Grey Lime	85	Erickson
	7	637	644	Grey Lime	85	Cridland
	4	644	648	Grey Lime	85	Newell
1-17-39	2	648	650	Grey Limestone	85	Erickson
	2	650	652	Limestone	85	Erickson
	3	652	655	Grey Limestone	85	Erickson
	8	655	663	Sandy lime	85	Cridland
	4	663	667	Grey Limestone	85	Newell
1-18-39	3	667	670	Hard Grey Lime	85	Cridland
	9	670	679	Grey Limestone	85	Newell
1-19-39	5	679	684	Grey Lime	85	Erickson
	3	684	685	Grey Lime	85	Cridland
	7	687	694	Grey Lime	85	Newell
1-20-39	6	694	700	Grey Lime	85	Erickson

1-20-39	7	700	707	Grey Lime	85	Cridland
	6	707	713	Grey Limestone	85	Newell
1-23-39	6	713	719	Grey Lime	85	Cridland
	4	719	723	Grey Lime	85	Newell
1-24-39	5	723	728	Grey Lime	85	Erickson
	5	728	733	Grey Lime	85	Cridland
	5	733	738	Grey Lime	85	Newell
1-25-39	4	738	742	Grey Lime	85	Erickson
	1	742	743	Shale	85	Erickson
1-26-39	6	743	749	Blue Shale	85	Erickson
	6	749	755	Blue & Green Shale	85	Cridland
	4	755	759	Blue Shale	85	Newell
	4	759	763	Blue Shale & Limestone	85	Newell
1-27-39	6	763	769	Blue Shale	85	Erickson
	7	769	776	Blue Shale	85	Newell
1-28-39	6	776	782	Blue Shale	85	Erickson
	7	782	789	Green & Blue Shale	85	Cridland
	1	789	790	Mixed Brown Shale & Lime	85	Newell
1-30-39	2	790	792	Brown Lime	85	Erickson
	1	792	793	Hard Dark Grey Lime	85	Cridland
	4	793	795	Hard Dark Grey Lime	85	Newell
1-31-39				Repairs to crane		
2-1-39				Filling with rock; cleaned to bottom of hole	85	Cridland
	6	795	801	Light Grey Lime, Hard	85	Newell
2-2-39	1	801	802	Grey Lime, Hard	85	Erickson
	5	802	807	Blue Shale, Very Sticky	85	Erickson
	7	807	814	Blue Shale	85	Cridland
	3	814	817	Light Grey Lime, Hard	85	Newell
	4	817	821	Sandstone	85	Newell
Delayed - fishing pipe out of hole.						
Cleaned out 20' of cave to 795.						
2-11-39	15	805	820	Cleaned to 820; pipe set in cave at 800'.	85	Newell
Cave hard to mix.						
2-13-39	10	810	820	Clean out cavings; trying to straighten pipe so 13½ bit will go in without guides.	85	Newell
	5	821	826		85	White
2-14-39	3	826	829		85	Newell
	4	829	832	Sand	85	White
2-15-39	4	832	836	Fine Sand	85	Erickson

2-15-39	1	836	837	Sandstone	85	Newell
2-16-39	3	837	840	Sand, Fine & Hard	85	Newell
	3	840	843	Hard Sand	85	White
2-17-39	3	843	846	Fine Sand	85	Erickson
	6	846	851	Sand, Hard & Fine	85	Newell
	3	851	854	Hard Sandy Lime	85	White
	1	854	855	Hard Lime	85	White
2-18-39	1	855	856	Hard Lime	85	White
2-20-39	1	856	857	Lime	85	White
	4	857	861	Sand, Fine & Hard	85	Newell
	5	861	866	Fine Sand	85	Erickson
2-21-39	5	866	871	Sand	85	White
	5	871	876	Sand, Fine & Hard	85	Newell
2-22-39	4	876	880	Sand	85	White
Running 22' 15" Casing						
	3	880	883	Fine Sand	85	Erickson
2-23-39	2	883	885	Hard Sand	85	White
	1	885	886	Sand	85	White
	2	886	888	Sand Showing Some Lime	85	Newell
	1	888	889	Lime	85	Erickson
2-24-39	3	889	892	Fine Sand	85	Erickson
	2	892	894	Brown Limestone	85	Newell
	6	894	900	Grey Limestone	85	Newell
	7	900	907	Brown Limestone	85	White
2-27-39	3	907	910	Limestone	85	Newell
	5	910	915	Limestone	85	White
	1	915	916	Limestone, Hard	85	Erickson
	1	916	917	Limestone	85	Erickson
2-28-39	3	917	920	Limestone	85	Erickson
	5	920	925	Limestone	85	White
	5	925	930	Sandy Lime	85	Newell
3-1-39	5	930	935	Limestone	85	Erickson
	4	935	939	Limestone	85	White
3-2-39	4	938	942	Limestone	85	Erickson
	5	942	947	Limestone	85	White
	4	947	951	Limestone	85	Newell
3-3-39	3	951	954	Limestone	85	Erickson
	1	954	955	Hard Dolomite	85	White
	1	955	956	Dolomite	85	White
				Hole strung in OK		
	2	955	957	Dolomite Lime	85	Newell

3-4-39	2	957	959	Dolomite & Lime, Hard	85	Newell
3-6-39	4	959	963	Dolomite & Lime	85	Newell
	4	963	967	Limestone	85	White
	4	967	971	Limestone	85	Erickson
3-7-39	3	971	974	Hard Limestone	85	Erickson
	5	974	979	Limestone	85	White
	6	979	985	Limestone	85	Newell
3-8-39	5	985	990	Limestone	85	Erickson
	4	990	994	Limestone	85	
	1	994	995	Limestone	85	Newell
3-9-39	3	995	998	Lime, Hard	85	Erickson
	5	998	1003	Limestone	85	White
	4	1003	1007	Lime	85	Nuss
3-10-39	3	1007	1010	Limestone	85	Erickson
	1	1010	1011	Sandy Lime	60	Newell
3-11-39	3	1011	1014	Lime, Hard & Fine	60	Nuss
	3	1014	1017	Sandy Lime, Hard	60	Newell
	3	1017	1020	Sandy Lime, (Water)	55	White
	4	1020	1024	Sandy Lime	55	White
3-12-39	4	1024	1028	Lime, Hard	75	Nuss
	4	1028	1032	Limestone	60	Newell
3-13-39	4	1032	1036	Lime, Grey	85	Nuss
Fishing for tools						
3-15-39	2	1040	1042	Cleaning out & drilling		White
	2	1042	1044	Limestone	50	Newell
3-16-39	1	1044	1045	Lime	75	Nuss
	5	1045	1050	Limestone	55	White
	4	1050	1054	Lime	55	Erickson
3-17-39	4	1054	1058	Lime	55	Nuss
	5	1058	1058	Limestone	55	White
				(Hole 5 feet short; made it up here.)		
	4	1058	1062	Lime, Hard	55	Erickson
3-18-39	3	1062	1065	Lime	55	Nuss
	2	1065	1067		55	Erickson
3-19-39	2	1068	1070	Limestone	55	Newell
	2	1070	1072	Lime	55	Erickson
3-20-39	1	1072	1073	Lime, Hard	55	Erickson
	5	1073	1078	Lime	275	White
	2	1078	1080	Dry Sand	275	White

Hole measured in

3-20-39	15	1080	1095	Limestone	275	Newell
3-21-39	5	1095	1100	Lime, Hard Shells	275	Nuss
	3	1100	1103	Lime, Some Sand	275	Nuss
	17	1103	1120	Sandy Lime	275	White
	10	1120	1130	Limestone	275	Newell
3-22-39	11	1130	1141	Lime, Soft & Grey	275	Nuss
	8	1141	1149	Lime	275	White
	2	1149	1151	Lime	190	Newell
	2	1151	1153	Limestone	190	Newell
3-23-39	5	1153	1158	Hard Grey Lime	275	Nuss
	3	1158	1161	Brown Lime	275	Erickson
	4	1161	1165	Hard Lime	175	Newell
3-24-39	5	1165	1170	Lime, Grey	175	Nuss
	7	1170	1177	Limestone	165	White
	3	1177	1180	Lime, Brown	175	Erickson
	1	1180	1181	Lime	175	Erickson
3-25-39	6	1181	1187	Lime, Grey	175	Nuss
	1	1187	1188	Lime	175	White
	2	1188	1190	Limestone	175	Erickson
	3	1190	1193	Lime	175	Erickson
3-26-39	5	1193	1198	Limestone	175	Erickson
	4	1198	1202	Lime, Grey	175	Nuss
3-27-39	4	1202	1206	Limestone	175	Erickson
	2	1206	1208	Limestone, Grey	175	Erickson
	6	1208	1214	Limestone	173	White
	6	1213	1219	Lime, Grey	173	Nuss
3-28-39	3	1219	1222	Limestone, Grey	175	Erickson
	3	1222	1225	Limestone	175	Erickson
	0	1225	1225	Lime & Sand	173	Nuss
	0	1225	1225	Repairs	173	Newell
3-29-39	0	1225	1225	Repairs	173	White
	10	1225	1235	Sand, Fine & Sharp	173	Erickson
3-30-39	12	1235	1247	Fine Sand	110	Newell
	12	1247	1259	Sand		White
	5	1259	1264	Sand, Fine & Sharp	110	Erickson
	3	1264	1267	Sand	110	Erickson
3-31-39	3	1267	1270	Sand, White & Hard	110	Nuss
	6	1270	1276	Sand, White & Soft	110	Nuss

3-31-39	5	1276	1281	Sand	99	White
	4	1281	1285	Sandy Lime	99	White
	6	1285	1291	Dolomite	95	Newell
4-1-39	6	1291	1297	Dolomite	98'5"	Nuss
	5	1297	1302	Dolomite	98'5"	White
	4	1302	1306	Dolomite	102	Newell
4-2-39	0	1306	1306	Repairs	98'5"	Nuss
4-4-39	0			Putting in Pump 70'	98	Newell
4-5-39	0			Repairs; Putting in Pump	98	Newell
4-6-39	0			Work on Pump	98	Newell

Test Started. 4-7-39

MASON CITY, IOWA

Date Started - 8-30-38

Date Completed - 10-6-39

Depth 1306'

Diameter - 28" to 140'; 19" to 821'; 14" to 1306'

Casing - 140' 20" Cast Iron pipe cemented in 28" hole; 14" I. D. Cast Iron liner set from 724 to 82'

Strata Record
Depth

<u>From</u>	<u>To</u>	<u>Thickness</u>	<u>Description of Beds</u>
Top	5	5	Top Soil
5	9	4	Clay, yellow
9	16	7	Clay, yellow - broken lime
16	17	1	" "
17	24	7	Blue lime shale rock
24	26	2	Limestone
26	30	4	Limestone - broken
30	46	16	Shale blue
46	47	1	Shale
47	53	6	Clay, blue
53	72	19	Clay, blue turning a little gray
72	75	3	Shale blue
75	79	4	Limestone
79	103	24	Limestone blue
103	105	2	Blue & gray
105	106	1	Lime, hard, gray
106	111	5	Lime, gray
111	118	7	Lime, hard, gray
118	120	2	Brownish, gray lime
120	121	1	Limestone
121	130 $\frac{1}{2}$	9 $\frac{1}{2}$	Lime, hard, gray
130 $\frac{1}{2}$	132	1 $\frac{1}{2}$	Limestone, hard blue
132	138	6	Lime, hard
138	143	5	Lime blue, hard
143	173	30	Lime gray
173	175	2	Lime blue, hard
175	195	20	Gray lime
195	200	5	Broken lime
200	203	3	Gray lime
203	211	8	Lime, hard
211	215	4	Broken lime
215	223	8	Lime gray
223	232	9	Hard gray lime
232	248	16	Lime, med. hard
248	254	6	Lime broken - green shale
254	256	2	Limestone - hard and brown
256	259	3	Limestone - with shale
259	261	2	Brown lime
261	270	9	Brown lime some shale
270	273	3	Brown Lime med. hard
273	277	4	" " " "
277	280	3	" " " "

<u>From</u>	<u>To</u>	<u>Thickness</u>	<u>Description of Beds</u>
280	294	14	Brown lime and shale
294	296	2	Brown Lime very hard
296	297	1	Brown lime and shale
297	301	4	Brown lime hard
301	306	5	Brown lime med. hard
306	309	3	Blue & brown lime
309	311	2	Blue lime
311	316	5	Blue shale
316	320	4	Blue lime & shale
320	330	10	Lime & shale - gray
330	335	5	Shale
335	338	3	Blue shale & brown lime
338	343	4	Gray lime & shale
343	349	6	Blue limestone
349	354	5	Gray lime
354	370	16	Gray & blue limestone
370	428	58	Gray lime - hard
428	434	6	Gray lime & shale
434	444	10	Gray lime - hard
444	486	42	Gray lime
486	494	8	Gray lime med. hard
494	505	11	Gray lime
505	511	6	Brown lime
511	516	5	Brown lime very hard
516	520	4	Brown lime
520	545	25	Brown lime hard
545	548	3	Gray lime very hard
548	551	3	Brown lime hard
551	655	104	Gray lime
655	663	8	Lime, sandy
663	742	79	Gray lime
742	749	7	Shale blue
749	755	6	Shale blue & green
755	759	4	Shale blue
759	763	4	Shale blue & limestone
763	769	6	Shale blue - sticky
769	782	13	Shale blue
782	789	7	Shale green & blue
789	790	1	Mixed brown shale brown lime & blue shale
790	792	2	Brown lime - hard
792	795	3	Lime dark gray - hard
795	802	7	Lime gray - hard
802	807	5	Shale, blue - very sticky
807	814	7	Shale blue
814	817	3	Lime light gray - hard
817	837	20	Sandstone
837	849	12	Sand - hard - fine
849	851	2	Sand
851	857	6	Hard, sandy lime
857	886	29	Sand - hard
886	888	2	Sand - showing lime
888	889	1	Lime
889	892	3	Sand - fine
892	925	33	Limestone
925	930	5	Limestone - sandy
930	954	24	Limestone

<u>From</u>	<u>To</u>	<u>Thickness</u>	<u>Description of Beds</u>
954	955	1	Dolomite - hard
955	963	8	Dolomite & lime
963	1010	47	Limestone
1010	1024	14	Limestone
1024	1032	8	Lime - sandy
1032	1036	4	Lime - gray
1036	1095	59	Limestone
1095	1103	8	Lime with hard shells
1103	1120	17	Lime sandy
1120	1130	10	Limestone
1130	1141	11	Lime - soft gray
1141	1158	17	Lime - hard gray
1158	1161	3	Lime brown
1161	1165	4	Lime - hard
1165	1170	5	Lime gray
1170	1177	7	Limestone
1177	1181	4	Lime - brown
1181	1187	6	Lime - gray
1187	1188	1	Lime
1188	1225	37	Limestone
1225	1267	42	Sand - fine
1267	1281	14	Sand - white "Jorden"
1281	1285	4	Lime - sandy
1285	1306	21	Dolomite

Static Water Levels

<u>From</u>	<u>To</u>	<u>Level</u>
26	618	14
618	625	29
625	632	75
632	1010	85
1010	1017	60
1017	1024	55
1024	1028	75
1028	1032	60
1032	1036	85
1036	1040	60
1040	1042	85
1042	1044	50
1044	1045	75
1045	1073	55
1073	1149	275
1149	1153	190
1153	1161	275
1161	1170	175
1170	1177	165
1177	1208	175
1208	1219	173
1219	1225	175
1225	1235	173
1235	1276	110
1276	1285	99
1285	1291	95
1291	1297	105
1297	1302	98.5
1302	1306	102

FURTHER TEST CONDUCTED November 28 1939

MASON CITY, CERRO GORDO COUNTY, IOWA

Pumping Test - Well No. 11

PWA Docket Iowa 1366-F

Data by R W Brooks and C B Patchen.

<u>Time</u>	<u>Drawdown</u>	<u>Discharge Pressure</u>	<u>Manometer Production</u>	<u>RPM</u>	<u>KWH Per Min</u>	<u>Elect. Meter</u>	<u>Total Pumping Head</u>	<u>KWH Per M Gal</u>
10:15 a.m.	108-213					1830.95		
10:25	36-275	48 -111	40 -1312		2.202		388	1.677
10:35	44-277	43½-100	40½-1320	1182	2.155		379	1.631
10:45	43-278	44 -101	39½-1304		2.105		381	1.615
10:55	44-277	42 - 97	39 -1298	1170	2.105		378	1.622
11:05	42-279	42 - 97	39½-1304		2.105		378	1.615
11:15	40-281	43½-100	40½-1320		2.181		385	1.655
11:25	39-282	44 -101	40½-1320		2.181		385	1.655
11:35	40-281	42½- 98	39½-1304	1170	2.21(?)		381	1.695(?)
11:50	40-281	42 - 97	39 -1298	1170	2.115		380	1.627
12:05 p.m.	40-281	42 - 97	39½-1304		2.122		390	1.628
12:20	38-283	43 -100	39½-1304	1163	2.125		385	1.630
12:35	38-283	40 - 92	38½-1290	1185	2.064		377	1.602
12:50	38-283	40 - 92	40 -1312		2.15		377	1.637
1:05	37½-283½	42 - 97	39½-1304	1177	2.16		382½	1.653
1:20	40-281	40½- 94	38 -1280		2.08		377	1.628
1:35	41-280	40 - 92	37 -1265	1165	2.055		374	1.627
1:50	40-281	41 - 95	38 -1280		2.105		378	1.643
2:10	38-283	41 - 95	39 -1304		2.135		380	1.635
2:25	39-282	41 - 95	38 -1280	1161	2.122		379	1.658
2:40	38-283	41 - 95	38 -1280		2.122		380	1.658
2:55	37-284	42 - 97	38½-1290	1163	2.18		383	1.692
3:10	37-284	43 - 99	39 -1304	1171	2.18		385	1.672
3:25	38-283	41 - 95	38 - 1280	1182	2.118		380	1.652
3:40	38-283	42 - 97	38½-1290		2.145		382	1.663
3:55	38-283	41½- 96	38 -1280		2.13		381	1.663
4:10	38-283	41½- 96	38 -1280	1171	2.135		381	1.667
4:25	37-284	42 - 97	38 -1280		2.155	1838.5	383	1.683

Total Production - 465,840 Gallons

Average Production 1,294 GPM

KWH 7,550

Cost per M Gallons 1.62¢

Average Voltage 102

MASON CITY, CERRO GORDO COUNTY, IOWA
Pumping Test - Well No. 11
PWA Docket Iowa 1366-F

Elevation pump base - 127.8 City Datum
Elevation discharge gauge - 129.8 City Datum

Data by H G Hershey, T W Robinson, & C B Patchen

Production measured with piezometer tube set 30" back of 7" orifice in 10" standard pipe

Time	Water Level Measured Feet	Water Level Corrected Feet	Piezometer	Pro- duction GPM	Elect. Meter	Discharge Press Feet	
November 23.							
2:05 p.m.	211.78	210.32					After 2 hr 15 min rest
2:17	211.65	210.19					
2:20					1788.8		1788.8 elect. meter start
2:21	258.6	257.1	38.5	1290		105	
2:22	269.3	268.0					
2:23	274.1	272.8	37.5	1275			
2:24	276.2	274.9					
2:25	276.8	275.5	36.0	1250			
2:30	279.3	278.0	35.5	1240		103	
2:35	280.7	279.4	35.5	1240	1789.15	104	Water clear
2:40	281.6	280.3	35.5	1240		104	
2:45	282.9	281.6	35.75	1245		105	
2:50	283.2	281.9	35.75	1245		105 -	
3:00	284.6	283.3	36.25	1235		107	
3:10	284.7	283.4	35.75	1245		107	
3:20	284.3	283.0	35.0	1233	1790.05	104 -	
3:30	284.4	283.1	35.0	1233		104 -	
3:40	286.0	284.7	36.0	1250		107	
3:50	284.6	283.3	35.0	1233	1790.0	105 -	
4:00	282.7	281.4	33.5	1210		102	
4:10	283.8	282.5	33.5	1210		103	A-39° W-50 $\frac{1}{2}$ °
4:20	283.9	282.6	34.0	1215	1791.4	102 -	
4:30	285.7	284.4	34.5	1230 +		104	W-50° T.W.R.
4:40	284.7	283.4	34.0	1215		102	
4:50	285.0	283.7	34.25	1217	1792.0	103 -	
5:05	286.0	284.7	34.5	1220 +		105	
5:20	286.5	285.2	34.75	1227	1792.8	106 -	
5:35	287.0	285.7	35.0	1233		106	
5:50	286.0	284.7	34.0	1215	1793.3	103 -	
6:05	285.7	284.4	33.75	1212		102	
6:20	285.7	284.4	33.75	1212	1793.95	103 -	
6:35	286.0	284.7	34.25	1217		103	
6:50	284.6	283.3	32.75	1194		100 -	
7:05	285.0	283.7	33.0	1198		101	
7:20	285.0	283.7	33.0	1198		101 -	
7:35	287.3	286.0	34.75	1227		105	
7:50	284.1	282.8	32.0	1180		97 -	
8:05	284.2	282.9	32.75	1194		98	
8:20	288.8	287.5	35.0	1233	1796.35	107 -	
8:50	286.8	285.5	33.75	1212		103	
9:20	288.4	287.1	34.5	1220 +	1797.7	106	
9:50	287.3	286.0	33.75	1212	1798.3	104	
10:20	286.7	285.4	33.25	1205	1798.95	103	
10:50	286.9	285.6	33.25	1205	1799.7	103	
11:05	288.9	287.6	34.25	1227		108	
11:20	288.5	287.2	34.25	1217	1800.25	105	
11:50	287.4	286.1	33.5	1207	1800.95	104	

<u>Time</u>	<u>Water Level Measured Feet</u>	<u>Water Level Corrected Feet</u>	<u>Piezometer</u>	<u>Pro-duction GPM</u>	<u>Elect. Meter</u>	<u>Discharge Press Feet</u>	
November 24.							
12:20 a.m.	287.4	286.1	33.25	1205	1801.55	104	
12:50	288.8	287.5	34.25	1217	1802.4	106	
1:20	287.3	286.0	33.25	1205	1802.95	104	
1:50	287.8	286.5	33.5	1207	1803.4	105	Water 50.2° C.B.P
2:20	287.4	286.1	33.25	1205	1804.0	105	
2:50	286.5	285.2	32.5	1190	1804.65	102	
3:20	288.4	287.1	33.75	1212	1805.2	106	
3:50	287.5	286.2	33.0	1198	1805.9	104	
4:20	286.8	285.5	32.25	1185	1806.45	102	
4:50	288.0	286.7	33.25	1205	1807.15	104	
5:20	287.4	286.1	32.75	1194	1807.85	104	
5:50	287.5	286.2	33.00	1198	1808.4	102	
6:20	286.4	285.1	32.25	1185	1809.05	102	
6:50	287.3	286.0	32.5	1190	1809.7	103	
7:20	287.6	286.3	32.75	1194	1810.3	103	
7:50	286.4	285.1	32 -	1178	1811.0	101	
8:20	287.5	286.2	31.75	1175	1811.75	101	
8:50	288.7	287.4	34.0	1215		106	
9:20	287.5	286.2	32.25	1185		101	
9:50	287.7	286.5	32.25	1185	1813.55	101	Water 50½ J T.W.R.
10:20	289.6	288.3	33.75	1212	1814.05	106	Water 50.6
10:50	285.4	284.1	31.0	1162	1814.7	97	
11:20	288.3	287.0	32.75	1194	1815.3	103	
11:50	286.8	285.5	31.75	1175	1816.0	101	
12:05 p.m.	289.0	287.7	33.25	1205		104	
12:20	288.7	287.4	33.0	1198	1816.6	104	
12:35	288.2	286.9	32.5	1190		103	
12:50	288.1	286.8	32.75	1194	1817.3	103	
1:05	288.5	287.2	33.00	1198		104	
1:20	286.4	285.1	31.50	1170	1817.95	99	
1:35	288.0	286.7	33.00	1198		103	
1:50	288.0	286.7	32.50	1190	1818.50	103	
2:05	287.1	285.8	31.50	1170		100	A-37 W-50½ & 50.6
2:20	286.1	284.8	31.0	1162	1819.1	96	Shut off

Average production	1203.1 GPM
Average pumping level	285.6 Ft
Average discharge head	103 Ft (Gauge 2' above pt of ref)
Average total head	390.6 Ft
Average voltage	104
Total Production for Test - 1,732,464 Gallons	

4

CITY OF MASON CITY
IOWA

RENA B. MACK, CITY CLERK AND AUDITOR
C. H. STEVENS, CITY ENGINEER
C. B. PATCHEN, SUPT. WATERWORKS
HAROLD E. WOLFE, CHIEF POLICE DEPT.
DANIEL H. SHIRE, CHIEF FIRE DEPT.
DR. C. M. FRANCHERE, HEALTH DIRECTOR
A. P. BEYERS, BUILDING INSPECTOR

HERBERT T. BARCLAY
CITY MANAGER

RAY E. FAULEY, MAYOR
HARRY C. BROWN, COUNCILMAN
ARLEIGH J. MARSHALL, COUNCILMAN
CARL GRUPP, COUNCILMAN
JOHN GALLAGHER, COUNCILMAN
CHAS. E. CORNWELL, CITY ATTORNEY

December 2 1939

Dr H G Hershey
State Geological Survey
University of Iowa
Iowa City, Iowa

Dear Hersh

I am enclosing notes on our test, which I finally got copied in my book. Also enclosing a typewritten copy of the notes on the actual test, which may be of use to you, and also some notes on the test which Brooks and I took last Tuesday.

As you will note, this showed quite an improvement in pump efficiency, which was accomplished by lowering the impellers in the bowls. Taking into consideration the low voltage, we accepted the pump as is without penalty.

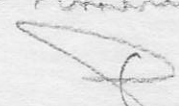
I wish to thank you and Mr Robinson again for your assistance and cooperation in this test. With best regards, I am

Very truly yours



C B Patchen, Superintendent

P.S. Hope the analysis "without 7" will be forthcoming soon.

P.P.S. Another 2 weeks and I'll be ready
level - material - minor - minor




1

New Benchmark Mason City 4/6/39

Loc.: Top of Flat, horizontal metal plate on top of cement abutment below standard (up which supply pipe runs) for new water tower, just west of New Mason City Well #11 west of intersection of S. Federal & 21st St. Elev 1170.42 A.T.

This point is 5.52' above reference pt. used for readings previous to this date.

Ref. pt. used for readings of this pumping test is 3.22' below Benchmark & 2.3' above former reference level

Mason City, Cerro Gordo County
City Well # 11

Page 4.

2

Results of Pumping Test on Jordan Sandstone

April 6, 7, 1939

Date	Time	Water level below curb			Interval		Total		Prod. Gpm.	Temp.		Remarks
		Rdg.	Corr.	Cor. Rdg.	D down	Elapsed Time	D down	Elapsed Time		Air	Water	
4/6/39	6-30-00 Pm	99.23										Static level
4/7/39	10-47-00 Am	98.86										" "
	-57-00											started pumping
	-58-00	192.06										
	-59-00											stopped pumping
	-59-30	170.1										Recoveries
	11-00-00	158.75										
	01-00	158.57										
	02-00	158.15										
	03-00	157.09										
	04-00	156.18										
	05-00	154.9										
	14-00											Started pumping
	16-00	215.9										
	16-10											shut valve down slightly
	17-00	203.3										
	18-00	195.7										
	19-00	189.67										
	20-00	184.44										
	20-45											stopped pumping
	21-15	148.00										Recoveries
	21-45	144.4										
	21-50											Started pumping
	25-30	183.6										
	25-45											cut down valve opening
	26-30	178.38										
	27-30	174.3										
	28-30											opened valve slightly
	29-30	193.3										
	31-00											closed valve slightly
	33-00	209.45										
	34-00											closed valve slightly
	34-30	203.63										
	35-30	202.50										
	37-00	201.53										
	38-00	201.27										
	39-00	200.90										
	40-00	200.56										
	41-00	200.30										
	42-00	200.11										
	43-00	200.00										
	47-00	199.70										
	55-30	199.48										
12	05-00	199.67										
	16-00	199.75								38°	54°	
	22-30	200.00										
	31-00	199.67										
	42-00								132			
	46-00	199.44										25 sec. to fill 55 gal. bbl. (diam. 1.85, depth 2.80)
	59-00	199.58										
	1-11-00	198.99										
	1-18-00									44°	54°	
	1-25-00	198.23										

Note!! - readings above this
line are valueless because
of frequent changes of
lack of pumping rates

[illegible]

MASON CITY, CERRO GORDO CO., IOWA

CITY WELL NO. 11

PUMPING TEST APRIL 11-21, 1939

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
April 11	3:15 P.M.		121.56			
	3:40		121.86			
	4:00		121.76			
	5:30		231.36	-----1380		These readings not correct; obstruction at this point.
	5:35		231.41	1380		
	5:40		231.41			
	5:45		231.38			
	5:50		231.38			
	6:00		231.06	-----		Shut off.
	6:01		217.79			
	6:02		213.59			
	6:03		210.89			
	6:04		208.5			
	6:05		207.07			
	6:06		205.97			
	6:07		205.17			
	6:08		204.57			
	6:09		203.87			
	6:10		203.27			
	6:15		201.47			
	6:20		200.27			
	6:25		198.96			
	6:30		198.36			
	9:25		193.56			
April 12	9:25 A. M.		190.76			
			190.66			
	9:30					Pump started.
	9:40		231.56	-----23	1511	Readings unreliable.
	9:45		231.36	22	1480	
	10:00		231.36	21	1450	
	11:40		231.86	-----20 $\frac{1}{4}$	1427	
	1:15 P.M.			19 $\frac{3}{4}$	1411	
	2:30			19 $\frac{1}{2}$	1402	
	3:20					Shut off.
	3:40		208.37			Turned on.
	3:55		339' 9"	22	1480	Production dropping.
	4:20		338' 9"	21 $\frac{1}{4}$	1457	
	4:45		338			
	6:20		336' 9"	20	1420	
	7:00		336' 9"	20	1420	
	7:45		336' 9"	20 $\frac{1}{4}$	1427	
	7:53		336' 9"	20	1420	

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
April 12	8:15 P.M.		336' 9"	20 $\frac{1}{4}$	1427	
	8:46					Pump shut off.
	8:46 $\frac{1}{2}$	60	307' 9"			
	8:47	90	277' 9"			
	8:48	129	238' 9"			
	8:49	148	219' 9"			
	8:53	150	217' 9"			
	8:54	150	217' 9"			
	8:57		214.1			Elec. apparatus
	9:01		212.85			" "
	9:06		211.85			" "
	9:11		211.15			" "
	9:16		210.40			" "
	9:17					Turned on.
	9:17 $\frac{1}{2}$	115	252' 9"			
	9:18	93	274' 9"			
	9:18 $\frac{1}{2}$	67	300' 9"			
	9:19	55	312' 9"			
	9:20	38	329' 9"	29	1696	
	9:20 $\frac{1}{2}$			28	1667	
	9:21	30	337' 9"	26 $\frac{1}{2}$	1624	
	9:22	26	341' 9"	25 $\frac{1}{2}$	1595	
	9:27	25	342' 9"	24-3/16	1555	
	9:32	25	342' 9"	23 $\frac{1}{2}$	1529	
	9:37	25+	342' 9"	23 $\frac{1}{2}$	1529	
	9:42	25	342' 9"	23	1513	
	9:47	26	341' 9"	23-3/8	1525	
	9:57	26	341' 9"	23-1/8	1517	
	10:07	26	341' 9"	22-5/8	1500	
	10:17	27	340' 9"	22-3/8	1492	
	10:27	27	340' 9"	22-3/8	1492	
	10:37	27	340' 9"	22 $\frac{1}{4}$	1488	
	10:38					Pump shut off.
	10:38 $\frac{1}{2}$	97	270' 9"			
	10:39	139	228' 9"			
	10:39 $\frac{1}{2}$	146	221' 9"			
	10:40	147	220' 9"			
	10:43	149	218' 9"			
	10:48	152	215' 9"			
	10:52					Pump turned on.
	10:52 $\frac{1}{2}$	119	248' 9"			
	10:53	92	279' 9"			
	10:53 $\frac{1}{2}$	69	298' 9"			
	10:54	55	312' 9"	30	1725	
	10:54 $\frac{1}{2}$	47	320' 9"			

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
April 12	10:55 P.M.	38	329' 9"	27 $\frac{1}{2}$	1653	
	10:56	31	336' 9"	27	1638	
	10:57	28	339' 9"	26 $\frac{1}{4}$	1617	
	11:02	25	342' 9"	24 $\frac{1}{4}$	1555	
	11:07	25	342' 9"	23 $\frac{3}{4}$	1537	
	11:17	25	342' 9"	23-1/8	1517	
	11:52	25	342' 9"	22 $\frac{1}{4}$	1488	
April 13	12:22 A.M.	24	243' 9"	21 $\frac{3}{4}$	1472	
	12:52	24	243' 9"	21 $\frac{3}{4}$	1472	
	1:52	23 $\frac{1}{2}$	244' 3"	21-3/8	1461	
	5:30	23	244' 9"	21	1450	
	6:15	24	243' 9"			
	6:23			21-1/8	1454	Water became very cloudy but cleared quickly. Shut off.
	6:30					
	6:30 $\frac{1}{2}$	87	280' 9"			
	6:31	125	242' 9"			Back lash on pump stopped.
	6:31 $\frac{1}{2}$	144	223' 9"			
	6:32	144	223' 9"			
	6:35	147	220' 9"			
	6:46	151	216' 9"			
	6:50					Turned on.
	6:50 $\frac{1}{2}$	127	240' 9"			
	6:51	96	276' 9"			
	6:51 $\frac{1}{2}$	70	297' 9"	32	1781	
	6:52	56	311' 9"	29 $\frac{1}{2}$	1711	
	6:52 $\frac{1}{2}$	47	320' 9"	28 $\frac{1}{2}$	1682	
	6:53	38	329' 9"	27 $\frac{3}{4}$	1660	
	6:53 $\frac{1}{2}$	33	334' 9"	27 $\frac{1}{4}$	1645	
	6:54	30	337' 9"	26 $\frac{3}{4}$	1631	
	6:55	27	340' 9"	26	1609	
	6:56	25	342' 9"	25 $\frac{1}{2}$	1585	
	6:58	24 $\frac{1}{2}$	343' 3"	24 $\frac{1}{4}$	1555	
	7:00	24 $\frac{1}{2}$	343' 3"	24	1547	
	7:05	25	342' 9"	23-9/16	1531	
	7:35	24	343' 9"	22 $\frac{1}{2}$	1496	
	7:40					Shut off.
	7:40 $\frac{1}{2}$	84	283' 9"			
	7:41	132	235' 9"			
	7:41 $\frac{1}{2}$	144 $\frac{1}{2}$	223' 3"			
	7:42	145	222' 9"			
	7:43	146	221' 9"			
	7:44	147	220' 9"			
	7:45	148	219' 9"			

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
	7:47 $\frac{1}{2}$	149+	218' 9"			
	7:50	150 $\frac{1}{2}$	217' 3"			
	7:53	152	215' 6"			
	7:55	152	215' 6"			214.15 by elect. apparatus
	8:00					213.55 " "
	8:00 $\frac{1}{2}$	119	248' 9"			Turned on.
	8:01	90	277' 9"	33 $\frac{1}{2}$	1823	
	8:01 $\frac{1}{2}$	67	300' 9"	32	1781	
	8:02	54	313' 9"	31	1753	
	8:02 $\frac{1}{2}$	43	324' 9"	30	1725	
	8:03	35	332' 9"	29	1696	
	8:03 $\frac{1}{2}$	32	335' 9"	28	1667	
	8:04	28	339' 9"	27	1638	
	8:05	26	341' 9"	25 $\frac{1}{2}$	1595	
	8:10	28	339' 9"	26 $\frac{1}{2}$	1624	
	8:15	27 $\frac{1}{2}$	340' 3"	26	1609	
	8:25	35	332' 9"	22 $\frac{1}{2}$	1496	
	8:30	35	332' 9"	22 $\frac{1}{4}$	1488	
	8:35	37	330' 9"	22	1480	
	8:40	36	331' 9"	21 $\frac{3}{4}$	1472	Water "muddy"
	8:45	36	331' 9"	21 $\frac{3}{4}$	1472	
	8:50	36	331' 9"	21-5/8	1469	
	9:00	37	330' 9"	21-3/8	1463	
	9:10	37	330' 9"	21-3/8	1463	
	9:20	36	331' 9"	21 $\frac{3}{4}$	1472	
	9:30	36	331' 9"	21-7/8	1476	
	9:40	36	331' 9"	21-7/8	1476	
	9:50	36	331' 9"	21-5/8	1469	
	10:00	35 $\frac{1}{2}$	332' 3"	21 $\frac{1}{2}$	1465	
	10:01					Adjusting.
	10:04	70	297' 9"	9	950	
	10:06	82	285' 9"	10	1000	
	10:08	82 $\frac{1}{2}$	285' 3"	10 $\frac{1}{4}$	1012	
	10:15	83	284' 9"	10-3/16	1009	
	10:20	84	283' 9"	10 $\frac{1}{4}$	1012	
	10:23 $\frac{1}{2}$	70	297' 9"	13 $\frac{3}{4}$	1179	Opened.
	10:25	69	298' 9"	14	1190	
	10:30	68	299' 9"	14	1190	
	10:35	67	300' 9"	14 $\frac{1}{4}$	1200	
	10:40	66 $\frac{1}{2}$	301' 3"	14 $\frac{1}{4}$	1200	
	10:45	66	301' 9"	14 $\frac{1}{4}$	1200	
	10:50	66	301' 9"	14 $\frac{1}{4}$	1200	
	10:51					Shut off.

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G. P. M.	REMARKS
	10:51 $\frac{1}{2}$	125	242' 9"			
	10:52	145	222' 9"			
	10:52 $\frac{1}{2}$	150	217' 9"			
	10:53+	149	218' 9"			
	10:53 $\frac{1}{2}$	148	219' 9"			
	10:54	148	219' 9"			
	10:56	148	219' 9"			
	10:58 $\frac{1}{2}$	149 $\frac{1}{2}$	218' 3"			
	11:01	150	217' 9"			
	11:11	151	216' 9"			
	11:17	152	215' 9"			
	12:36 P.M.	156	211' 9"			Pump started.
	12:36 $\frac{1}{2}$	133	234' 9"			
	12:37	114	253' 9"			
	12:37 $\frac{1}{2}$	104	263' 9"	18	1350	
	12:38	96	271' 9"	17 $\frac{1}{2}$	1331	
	12:38 $\frac{1}{2}$	92	275' 9"	17	1312	
	12:39	89	278' 9"	17	1312	
	12:39 $\frac{1}{2}$	87	280' 9"	16 $\frac{1}{4}$	1293	
	12:40	85	282' 9"	16 $\frac{1}{2}$	1293	
	12:40 $\frac{1}{2}$	83	284' 9"	16 $\frac{1}{2}$	1293	
	12:41	82	285' 9"	16 $\frac{1}{2}$	1293	
	12:42	81	286' 9"	16	1275	
	12:43	80	287' 9"	16	1275	
	12:44	79 $\frac{1}{2}$	388' 3"	16	1275	
	12:45	79	388' 9"	16	1275	
	12:46	78	389' 9"	16	1275	
	12:47	77 $\frac{1}{2}$	390' 3"	16	1275	
	12:51	76	291' 9"	16	1275	
	12:56	75	392' 9"	15-7/8	1270	
	1:01	75	292' 9"	16	1275	
	1:02					Opened wide on valve.
	3:00	41	326' 9"	25	1580	Cut down
	3:10	81	286' 9"	10	1000	
	3:12	88	279' 9"	10 $\frac{1}{4}$	1012	
	3:15	91	276' 9"	10 $\frac{1}{4}$ +	1012	
	3:20	93	274' 9"	10 $\frac{1}{4}$ +	1012	
	3:25	94	273' 9"	10 $\frac{1}{2}$	1025	
	3:26					Opened valve.
	3:27	86	281' 9"	13 $\frac{1}{2}$	1167	
	3:30	83	284' 9"	13 $\frac{1}{2}$	1167	
	3:35	81	286' 9"	14	1190	
	3:40	80+	287' 9"	14+	1190	
	3:45	80+	287' 9"	14	1190	

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
	3:46 to					
	3:48					Opened wide.
	3:50	46	321' 9"	27	1638	
	3:55	43	324' 9"	24 $\frac{3}{4}$	1571	
	4:00	43 $\frac{1}{2}$	324' 3"	24 $\frac{1}{2}$	1563	
	4:01					Pump shut off.
	4:01 $\frac{1}{2}$	107	360' 9"			
	4:02	134	233' 9"			
	4:02 $\frac{1}{2}$	142	225' 9"			
	4:03	145	222' 9"			
	4:04	146	221' 9"			
	4:05	147	220' 9"			
	4:06	148	219' 9"			
	4:11	150	217' 9"			
	4:16	151	216' 9"			
	4:20	152	215' 9"			
	4:21					Pump start 4:21. Wide open.
	4:21 $\frac{1}{2}$	119	248' 9"			
	4:22	97	270' 9"	34	1837	
	4:22 $\frac{1}{2}$	80	287' 9"	32	1781	
	4:23	67	300' 9"	31	1753	
	4:23 $\frac{1}{2}$	61	306' 9"	30	1725	
	4:24	57	310' 9"	29 $\frac{1}{4}$	1703	
	4:24 $\frac{1}{2}$	56	311' 9"	29	1696	
	4:25	52	315' 9"	28 $\frac{3}{4}$	1682	
	4:25 $\frac{1}{2}$	49	318' 9"	28 $\frac{1}{4}$	1674	
	4:26	46	321' 9"	28	1667	
	4:31	40	327' 9"	26 $\frac{1}{2}$	1624	
	4:36	38	329' 9"	26	1609	
	5:00	32	335' 9"	25	1580	
	5:20		214.96			Stop Start. Using electrical apparatus.
	5:22	80	287' 9"	32	1781	
	6:00	32	335' 9"	25	1580	
	6:20		214.06			Stop Start. Using electrical apparatus.
	7:00	34	333' 9"	26 $\frac{1}{2}$	1624	
	7:20		214.66			Stop Start. Using electrical apparatus.
	8:00	35	332' 9"	27 $\frac{1}{2}$	1653	Stop

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
	8:20		213.86			Start. Using elec. apparatus.
	9:00	40	327' 9"	26 $\frac{1}{2}$	1624	Stop.
	9:20		214.26			Start. Using elec. apparatus.
	10:00	37	330' 9"	27-3/8	1648	Stop.
	10:05					Shut off.
	10:05 $\frac{1}{2}$	90	277' 9"			
	10:06	121	246' 9"			
	10:06 $\frac{1}{2}$	129	238' 9"			
	10:07	134	233' 9"			
	10:08	141	226' 9"			
	10:09	147	220' 9"			
	10:10	148	219' 9"			
	10:15	150	217' 9"			
	10:20	152	215' 9"			
	10:20 $\frac{1}{2}$	115	252' 9"			
	10:21	90	277' 9"			
	10:21 $\frac{1}{2}$	75	292' 9"			
	10:22	66	301' 9"			
	10:22 $\frac{1}{2}$	61	306' 9"			
	10:23	58	309' 9"			
	10:23 $\frac{1}{2}$	55	312' 9"			
	10:24	55	312' 9"	29 $\frac{1}{2}$	1711	
	10:24 $\frac{1}{2}$	54	313' 9"			
	10:25	53	314' 9"	29 $\frac{1}{2}$	1711	
	10:25 $\frac{1}{2}$	51+	316' 9"	29	1696	
	10:26	51-	316' 9"	29	1696	
	10:30	48	319' 9"	29	1696	
	10:35	45+	322' 9"	29	1696	
	10:40	46	321' 9"	27 $\frac{3}{4}$	1660	
	11:00	46	321' 9"	27	1638	Stop.
	11:20		216			Start. Using elec. apparatus.
	12:00	46	321' 9"	27 $\frac{3}{4}$	1660	Stop.
April 14	8:56 A. M.		207.8			Using elec. apparatus
	9:00	159	208' 9"			
	9:00 $\frac{1}{2}$	127	240' 9"			
	9:01	102	265' 9"			Monometer too high. to read.
	9:01 $\frac{1}{2}$	83	284' 9"	34	1837	
	9:02	70	297' 9"	33 $\frac{1}{2}$	1823	
	9:02 $\frac{1}{2}$	64	303' 9"	32 $\frac{1}{2}$	1795	
	9:03	59	308' 9"	32	1781	
	9:03 $\frac{1}{2}$	56	311' 9"	31 $\frac{3}{4}$	1774	
	9:04	55	312' 9"	31 $\frac{1}{2}$	1767	

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
	9:04 $\frac{1}{2}$	53	314' 9"	31 $\frac{1}{4}$	1759	
	9:05	52	315' 9"	31	1753	
	9:07 $\frac{1}{2}$	48+	319' 9"	30 $\frac{1}{4}$	1732	
	9:10	48	319' 9"	29 $\frac{1}{2}$	1710	
	9:15	47	320' 9"	29 $\frac{1}{2}$	1710	
	9:20	45-	322' 9"	29-5/8	1713	
	9:25	44	323' 9"	29 $\frac{1}{2}$	1710	
	9:30	42	325' 9"	29 $\frac{1}{2}$	1710	
	9:31					
	9:51		211			Cut off.
	10:06		210			
	10:06					
	10:21	45+	322' 9"	29 $\frac{1}{4}$	1703	Pump turned on.
	10:36	44	323' 9"	29	1695	
	10:51	42 $\frac{1}{2}$	325' 3"	28 $\frac{3}{4}$	1689	
	11:01	42	325' 9"	29	1696	Cut down 11:01-11:03
	11:04	75	292' 9"	14 $\frac{3}{4}$	1121	
	11:06	81	286' 9"	15 $\frac{1}{4}$	1242	
	11:10	82	285' 9"	15 $\frac{1}{4}$	1242	
	11:15	83	284' 9"	15 $\frac{1}{4}$	1242	
	11:16					Cut down
	11:17	98	269' 9"	9 $\frac{1}{4}$	962	
	11:20	103	264' 9"	9 $\frac{1}{4}$	962	
	11:25	105	262' 9"	9	950	
	11:30	106	261' 9"	9	950	
	11:35	106	261' 9"	9	950	
	11:36					Opened wide.
	1:19 P.M.	47	320' 9"	29	1696	
	1:30					
	1:41	47	320' 9"	28	1667	
	2:30*	155	212'			
	3:30	47	320'	29	1696	
	4:00	154	213'			
	5:00	45	322'	29 $\frac{1}{2}$	1711	
	5:30	155	212'			
	6:30	46	321'	29	1696	
	7:00	154	213'			
	8:00	49	318'	28 $\frac{1}{2}$	1682	
	8:30	154	223'			
	9:30	45	322'	29 $\frac{1}{2}$	1711	
	10:00	155	212'			
	11:00	47	320'	29 $\frac{1}{2}$	1711	
	11:30	153	214'			
	12:00	46	321'	29 $\frac{1}{2}$	1711	

* In readings after this time are in even feet

DATE	TIME	AIR LINE GUAGE READ.	DEPTH TO WATER	MONO. TUBE READ.	PROD. G.P.M.	REMARKS
April 16	7:00 A.M.	161	206			
April 17	8:00 A. M.	163	204			
	8:05					Started to pump.
	8:15	46	321	33 $\frac{1}{2}$	1823	
	8:30	40	327	32	1781	
	8:50	40	327	31	1753	
	9:00	39	328	30 $\frac{1}{2}$	1739	
	9:30	39	328	30	1725	Shut down.
	10:00	156	211			
	10:24	43	324	31	1753	
	10:28	57	310	22	1480	
	10:35	66	301	22	1480	
	10:37	75	292	15	1232	
	10:40	86	281	15 $\frac{1}{2}$	1254	
	10:42	105	262	8 $\frac{1}{2}$	925	
	10:52	113	254	8 $\frac{1}{4}$	912	
	11:00	47	320	31	1753	Shut off. Back to 155' in 1 minute.
	11:30	158	209			
	12:30	42	325	30	1725	
	1:00	158	209			
	2:00	42	325	30 $\frac{1}{2}$	1739	
	2:30	156	211			
	3:30	41	326	30 $\frac{1}{2}$	1739	
	4:00	156	211			
	5:00	43	324	30	1725	
	5:30	155	212			
	6:30	41	326	31	1753	
	7:00	156	211			
	7:55	44	323	30	1725	
	8:05	86	281	15	1232	
	8:10	43	324	31 $\frac{1}{2}$	1767	
	8:30	154	213			
	9:30	43	324	31	1753	
	10:00	155	212			
	11:00	43	324	31	1753	
	11:30	156	211			

November 25, 1947

Mr. C. W. Hamblin,
Water Superintendent
City of Mason City
Mason City, Iowa

Dear Mr. Hamblin:

Enclosed is a copy of the results of the pumping tests made in November, 1947 on the Mason City well No. 12 when the well was 1377 feet deep.

Following is a record of the hole size and amount of casing in the Mason City No. 11 well according to our data:

Hole size: 28" dia. from 0' to 142'8"
19" dia. from 142'8" to 821'
14" dia. from 821' to 1306'3"

Casing Record: 142'8" of 20" Monoloy Cast Iron casing from 0' to 142'8" cemented in from bottom to top.
64' of 14" Monoloy Cast Iron casing attached to 37'1" of 16" (O.D.) wrought iron pipe attached to 1'11" steel shoe at bottom from about 715'3" to about 818'.
216'5½" of 10" extra heavy wrought iron pipe with welded joints from 715'3" to 931'8½".
Cemented in lower 20' and resting on 5' of cement liner.

We apparently have no information on the effective depth of the well after Layne-Western put in the 10-inch liner in 1941.

Please let us know if you note any corrections or have any questions in regard to the pumping test data. The water analysis reports will be sent to you as soon as possible.

Very truly yours,

H. G. Hershey

HGH:WEH:AEH
ENC.

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IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

Mason City - Cerro Gordo County
Mason City Well No. 11: Pumping Test Oct. 9, 1941

9:00 a.m. 207' gauge reading = 207' 10" by our electric line
(after 11½ hrs. rest). Air line 310' 7 3/16"

Time	Gauge Reading In Feet	Corrected Depth to Water In Feet	Manometer Tube in Inches	Production In G.P.M.	Character of Water	Remarks
9:20a.m.	103½	207.8				Pump started
9:20½	76	235.3				
9:20¾					Apparently clear	
9:21	79	232.3				
9:22	79	232.3	20	933		
9:22½			17	863		
9:23	73	238.3	15	812		
9:24	73	238.3	15	812	Few sand grains (first sam- ple taken)	
9:25	72½	238.8	"	"	Few sand grains	
9:30	70½	240.8	"	"	"	
9:35	69½	241.8	"	"	"	
9:40	69	242.3	"	"	Beginning to cloud, some sand	
9:42			"	"	Cloudy, some sand	
9:44			14¾	807	"	
9:45	68½	242.8	"	"	"	
9:50	68	243.3	"	"	"	
9:55			14½	799	Slightly less sand, cloudy	
10:00	67	244.3	"	"	"	
10:05			"	"	Clearing, trace of sand (less than above)	
10:10	65½	245.8	"	"	"	
10:15			"	"	Almost clear, trace of sand	
10:20	65	246.3	14½	799	"	
10:25			"	"	"	
10:30	65	246.3	"	"	"	
10:35			"	"	<u>Very few</u> sand grains	
10:40	64½	246.8	"	"	"	20.5 g.p.m. per ft. draw down
10:41			"	"		Pump shut off
10:41½	96	215.3				
10:42	102	209.3				
10:42½	103	208.3				
10:43	100½	210.8				

Time	Gauge Reading In Feet	Corrected Depth to Water In Feet	Manometer Tube in Inches	Production In G.P.M.	Character of Water	Remarks
10:44	97 $\frac{1}{2}$	213.8				
10:45	97 $\frac{1}{2}$	213.8				
10:46	97 $\frac{1}{2}$	213.8				
10:47	98	213.3				
10:48	98 $\frac{1}{2}$	212.8				
10:49	98 $\frac{1}{2}$	212.8				
10:52	99 $\frac{1}{2}$	211.8				
10:55	100	211.3				
11:00	100 $\frac{1}{2}$	210.8				Pump started
11:00 $\frac{1}{2}$	70	241.3				
11:01	71	240.3				
11:01 $\frac{1}{2}$			11	698	Apparently clear	
11:02	77 $\frac{1}{2}$	233.8	11	698		
11:03	76 $\frac{1}{2}$	234.8	"	"	Clear, trace of sand	
11:04	75 $\frac{1}{2}$	235.8	"	"	"	
11:05	75	236.3	"	"	"	
11:08			"	"	Clear, few sand grains	
11:10	73	238.3	"	"	Clear, <u>very few</u> grains	
11:14			14 $\frac{1}{2}$	792	"	Increase pump rate
11:20	67 $\frac{1}{2}$	243.8	"	"		
11:25	66 $\frac{1}{2}$	244.8	"	"	Very slightly turbid	
11:30	65 $\frac{1}{2}$	245.8	"	"	"	
11:37			"	"	Slightly turbid, trace of sand	
11:40	65	246.3	"	"	"	
11:45			"	"	"	
11:50	64 $\frac{1}{2}$	246.8				
1:30p.m.	63	248.3				21 g.p.m. per ft. draw down Pump shut off
1:35						
1:35 $\frac{1}{2}$	71	240.3				
1:36	99	212.3				
1:36 $\frac{1}{2}$	101 $\frac{1}{2}$	209.8				
1:37	98	213.3				
1:38	96	215.3				
1:39	96	215.3				
1:40	96 $\frac{1}{2}$	214.8				
1:45	97 $\frac{1}{2}$	213.8				
1:50	98 $\frac{1}{2}$	212.8				
2:00	99	211.8				
2:27	100	210.8				
3:01	101 $\frac{1}{2}$	209.8				Pump started
3:01 $\frac{1}{2}$	72	239.3				

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Time	Gauge Reading In Feet	Corrected Depth to Water In Feet	Manometer Tube in Inches	Production In G.P.M.	Character of Water	Remarks
3:02	72 $\frac{1}{2}$	238.8				
3:03	79 $\frac{1}{2}$	231.8	10 $\frac{1}{2}$	682	Clear; trace of sand	
3:03 $\frac{1}{2}$			19 $\frac{1}{2}$	922	"	
3:04			16	833	"	
3:05	72 $\frac{1}{2}$	238.8	15	812	"	
3:06			15	812	"	
3:07			"	"	Clear, <u>few</u> sand grains	
3:10	69 $\frac{1}{2}$	241.8	"	"	"	
3:13			14 $\frac{3}{4}$	806	"	
3:15	68 $\frac{1}{2}$	242.8	"	"	Clear, <u>very few</u> sand grains	
3:18			"	"	"	
3:20			"	"	"	
3:23			14 $\frac{1}{2}$	799	"	
3:24			"	"	"	
3:27			"	"	Very slightly cloudy	
3:30	66 $\frac{1}{2}$	244.8	14 $\frac{1}{2}$	799	Slightly cloudy, small amt. sand	
3:35			"	"	"	
3:40	65 $\frac{1}{2}$	245.8	"	"		
3:45			"	"	Appears to be clearing slightly	Water temp. 50.0°F. flowing through 45-50 ft. 10" pipe. Air Temp. 59.0°F
3:50	64 $\frac{1}{2}$	246.5	"	"	Clearing up - trace of sand	
3:55			"	"	Almost clear	
4:05	64 $\frac{1}{2}$	246.8	"	"	Clear, very little sand	
4:15	64	247.3	"	"	"	
4:25	64	247.3	"	"	Clear, <u>very few</u> sand grains	
4:40	64	247.5	"	"	"	
5:00	63 $\frac{1}{2}$	247.8	"	"	"	
5:15	63	248.3	"	"	"	
5:30	63	248.5	"	"	"	20.5 g.p.m. per ft. Draw down

C. B. Patchen
K. E. Anderson
H. G. Hershey

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

Generalized Log

MASON CITY WELL NO. 11

Survey No. W-0828

Drilled by: C. W. Varner, Dubuque Date: Sept. 1938 to February, 1939

Total Depth: 1305' Curb Elevation: 1166' Static Level

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
PLEISTOCENE SYSTEM				
1.	Soil, dark brown, slightly sandy	3'	0	3'
2.	Drift, yellow buff, oxidized, unleached, silty textured	9'	3'	12'
DEVONIAN SYSTEM				
<u>Lime Creek Formation</u>				
3.	Dolomite, light to medium gray, fine sandy textured, moderately hard, with 0-1% pyrite	20'	12'	32'
4.	Shale, dolomitic, light gray, silty textured, structureless	8'	32'	40'
5.	Dolomite, light gray, fine sandy textured, hard	5'	40'	45'
Juniper Hill Shale Member				
6.	Shale, light gray, non-calcareous, structureless	30'	45'	75'
<u>Shell Rock Formation</u>				
7.	Dolomite, gray, drab mottled, translucent, coarsely crystalline, pyritic, becoming calcareous at base	13'	75'	88'
8.	Limestone, dolomitic, gray, subcrystalline, with bands of pure chalky white limestone	12'	88'	100'
9.	Dolomite, drab gray, mottled light brown, subcrystalline, hard, with trace of pyrite	10'	100'	110'

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
10.	Dolomite, drab, fine crystalline, translucent, with one thin band of dark brown dolomite	5'	110'	115'
<u>Cedar Valley and Wapsipinicon Formations</u>				
11.	Dolomite, gray to drab, fine granular texture, pyritic, with some free calcite	38'	115'	153'
12.	Limestone, light brown, medium to coarse crystalline, somewhat clastic textured, pyritic, some free calcite	6'	153'	159'
13.	Dolomite, calcareous, light brown to drab, with thin bands of limestone	11'	159'	170'
14.	Limestone, drab, fine crystalline, translucent	1'	170'	171'
15.	Dolomite, drab to gray, mottled, medium to coarse crystalline	9'	171'	180'
16.	Dolomite, drab to gray, fine crystalline, porous in parts, pyritic	15'	180'	195'
17.	Dolomite, light brown and light gray interbanded, medium to coarse crystalline, with thin bands of subcrystalline gray dolomite	5'	195'	200'
18.	Dolomite, light brown and light gray interbanded, fine crystalline, hard, translucent	10'	200'	210'
19.	Dolomite, calcareous, light brown to drab gray, medium to coarse crystalline	5'	210'	215'
20.	Dolomite, calcareous, light brown to drab gray, fine crystalline, finely porous, with 3% clear calcite	10'	215'	225'
21.	Dolomite, brown, fine crystalline, hard, with occasional fine crystalline gray dolomite bands, traces pyrite	70'	225'	295'
22.	Dolomite, calcareous dolomite, and limestone interbanded, light brown, fine crystalline, translucent, with thin bands of gray dolomite	15'	295'	310'

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
ORDOVICIAN SYSTEM (?)				
Maquoketa Formation (?)				
23.	Shale, light gray, as well mud	6'	310'	316'
24.	Dolomite, drab to gray, fine crystalline, slightly porous	14'	316'	330'
25.	Dolomite, light gray, fine sugary texture	65'	330'	395'
<u>Galena and Platteville Formations (?)</u>				
26.	Limestone, drab to light gray, fine to medium crystalline, translucent, slightly pyritic	5'	395'	400'
27.	Limestone, brown to gray, fine crystalline, translucent	6'	400'	406'
28.	Dolomite, brown to gray, fine crystalline, translucent	3'	406'	409'
29.	Limestone, brown to buff, fine crystalline, translucent	4'	409'	413'
30.	Dolomite, pale buff to light gray, fine crystalline, translucent, traces of pyrite and clear calcite	12'	413'	425'
31.	Dolomite, drab to light brown, fine to medium crystalline, translucent	15'	425'	440'
32.	Dolomite, drab to gray, fine crystalline, translucent, with 50% white porcelain textured chert	20'	440'	460'
33.	Chert, white, porcelain textured to very fine crystalline, with 20% drab to gray fine crystalline dolomite	35'	460'	495'
34.	Dolomite, drab, fine to medium crystalline, sugary textured	23'	495'	518'
35.	Limestone, light drab to light buff, fine crystalline white, floury and somewhat flaky textured, occasional partially dolomitized bands. 1-5% white to gray chert from 615'-700'. Traces of Galena in upper part.	222'	518'	740'
36.	Shale, light gray green, calcareous, with 30-40% soft white floury textured limestone bands, fossiliferous	21'	740'	761'

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
37.	Limestone, light buff, sub crystalline	4'	761'	765'
38.	Shale, light green to gray-green, soft, slightly fossiliferous, pyritic	25'	765'	790'
39.	Limestone, drab to buff, fine crystalline, hard	10'	790'	800'
40.	Shale, green, as chips, pyritic, some sand cemented by pyrite, with some black dol. conglom. in matrix of pyrite	15'	800'	815'
41.	Shale, buff to brown, in splintery chips	4'	815'	819'
42.	Limestone, light buff, fine crystalline	1'	819'	820'
<u>St. Peter Sandstone</u>				
43.	Sandstone, white, medium grained, well sorted, clean	10'	820'	830'
44.	Sandstone, light brown, medium to fine grained, slightly silty	10'	830'	840'
45.	Sandstone or sandy shale, light gray, as sandy well mud, sand medium	15'	840'	855'
46.	Sandstone, white, clean, fine grained, well sorted	10'	855'	865'
47.	Sandstone, with pink shale bands, shale as well mud	5'	865'	870'
48.	Sandstone, white, medium grained, clean, well sorted	5'	870'	875'
49.	Sandstone, light brown, medium grained, fair sorting	13'	875'	888'
<u>Willow River Dolomite</u>				
50.	Dolomite, light buff to pinkish drab, fine crystalline, with band white oolitic chert at top, sandy in parts	12'	888'	900'
51.	Dolomite, drab, soft, calcareous, drills to flour, oolitic	20'	900'	920'
52.	Dolomite, drab, sub crystalline translucent and sandy	10'	920'	930'

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

Generalized Log

MASON CITY WELL NO. 11

Survey No. W-0828

Drilled by: C. W. Varner, Dubuque Date: Sept. 1938 to February, 1939

Total Depth: 1305' Curb Elevation: 1166' Static Level

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
PLEISTOCENE SYSTEM				
1.	Soil, dark brown, slightly sandy	3'	0	3'
2.	Drift, yellow buff, oxidized, unleached, silty textured	9'	3'	12'
DEVONIAN SYSTEM				
<u>Line Creek Formation</u>				
3.	Dolomite, light to medium gray, fine sandy textured, moderately hard, with 0-1% pyrite	20'	12'	32'
4.	Shale, dolomitic, light gray, silty textured, structureless	8'	32'	40'
5.	Dolomite, light gray, fine sandy textured, hard	5'	40'	45'
Juniper Hill Shale Member				
6.	Shale, light gray, non-calcareous, structureless	30'	45'	75'
<u>Shell Rock Formation</u>				
7.	Dolomite, gray, drab mottled, translucent, coarsely crystalline, pyritic, becoming calcareous at base	13'	75'	88'
8.	Limestone, dolomitic, gray, subcrystalline, with bands of pure chalky white limestone	12'	88'	100'
9.	Dolomite, drab gray, mottled light brown, subcrystalline, hard, with trace of pyrite	10'	100'	110'

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
10.	Dolomite, drab, fine crystalline, translucent, with one thin band of dark brown dolomite	5'	110'	115'
<u>Cedar Valley and Wapsipinicon Formations</u>				
11.	Dolomite, gray to drab, fine granular texture, pyritic, with some free calcite	38'	115'	153'
12.	Limestone, light brown, medium to coarse crystalline, somewhat clastic textured, pyritic, some free calcite	6'	153'	159'
13.	Dolomite, calcareous, light brown to drab, with thin bands of limestone	11'	159'	170'
14.	Limestone, drab, fine crystalline, translucent	1'	170'	171'
15.	Dolomite, drab to gray, mottled, medium to coarse crystalline	9'	171'	180'
16.	Dolomite, drab to gray, fine crystalline, porous in parts, pyritic	15'	180'	195'
17.	Dolomite, light brown and light gray interbanded, medium to coarse crystalline, with thin bands of subcrystalline gray dolomite	5'	195'	200'
18.	Dolomite, light brown and light gray interbanded, fine crystalline, hard, translucent	10'	200'	210'
19.	Dolomite, calcareous, light brown to drab gray, medium to coarse crystalline	5'	210'	215'
20.	Dolomite, calcareous, light brown to drab gray, fine crystalline, finely porous, with 3% clear calcite	10'	215'	225'
21.	Dolomite, brown, fine crystalline, hard, with occasional fine crystalline gray dolomite bands, traces pyrite	70'	225'	295'
22.	Dolomite, calcareous dolomite, and limestone interbanded, light brown, fine crystalline, translucent, with thin bands of gray dolomite	15'	295'	310'

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
ORDOVICIAN SYSTEM (?)				
Maquoketa Formation (?)				
23.	Shale, light gray, as well mud	6'	310'	316'
24.	Dolomite, drab to gray, fine crystalline, slightly porous	14'	316'	330'
25.	Dolomite, light gray, fine sugary texture	65'	330'	395'
<u>Galena and Platteville Formations (?)</u>				
26.	Limestone, drab to light gray, fine to medium crystalline, translucent, slightly pyritic	5'	395'	400'
27.	Limestone, brown to gray, fine crystalline, translucent	6'	400'	406'
28.	Dolomite, brown to gray, fine crystalline, translucent	3'	406'	409'
29.	Limestone, brown to buff, fine crystalline, translucent	4'	409'	413'
30.	Dolomite, pale buff to light gray, fine crystalline, translucent, traces of pyrite and clear calcite	12'	413'	425'
31.	Dolomite, drab to light brown, fine to medium crystalline, translucent	15'	425'	440'
32.	Dolomite, drab to gray, fine crystalline, translucent, with 50% white porcelain textured chert	20'	440'	460'
33.	Chert, white, porcelain textured to very fine crystalline, with 20% drab to gray fine crystalline dolomite	35'	460'	495'
34.	Dolomite, drab, fine to medium crystalline, sugary textured	23'	495'	518'
35.	Limestone, light drab to light buff, fine crystalline white, floury and somewhat flaky textured, occasional partially dolomitized bands. 1-5% white to gray chert from 615'-700'. Traces of Galena in upper part.	222'	518'	740'
36.	Shale, light gray green, calcareous, with 30-40% soft white floury textured limestone bands, fossiliferous	21'	740'	761'

<u>No.</u>	<u>Description of Formations</u>	<u>Thick.</u>	<u>From</u>	<u>To</u>
37.	Limestone, light buff, sub crystalline	4'	761'	765'
38.	Shale, light green to gray-green, soft, slightly fossiliferous, pyritic	25'	765'	790'
39.	Limestone, drab to buff, fine crystalline, hard	10'	790'	800'
40.	Shale, green, as chips, pyritic, some sand cemented by pyrite, with some black dol. conglom. in matrix of pyrite	15'	800'	815'
41.	Shale, buff to brown, in splintery chips	4'	815'	819'
42.	Limestone, light buff, fine crystalline	1'	819'	820'
<u>St. Peter Sandstone</u>				
43.	Sandstone, white, medium grained, well sorted, clean	10'	820'	830'
44.	Sandstone, light brown, medium to fine grained, slightly silty	10'	830'	840'
45.	Sandstone or sandy shale, light gray, as sandy well mud, sand medium	15'	840'	855'
46.	Sandstone, white, clean, fine grained, well sorted	10'	855'	865'
47.	Sandstone, with pink shale bands, shale as well mud	5'	865'	870'
48.	Sandstone, white, medium grained, clean, well sorted	5'	870'	875'
49.	Sandstone, light brown, medium grained, fair sorting	13'	875'	888'
<u>Willow River Dolomite</u>				
50.	Dolomite, light buff to pinkish drab, fine crystalline, with band white oolitic chert at top, sandy in parts	12'	888'	900'
51.	Dolomite, drab, soft, calcareous, drills to flour, oolitic	20'	900'	920'
52.	Dolomite, drab, sub crystalline translucent and sandy	10'	920'	930'

Generalized Log

MASON CITY WELL #11.

Survey No.: W-0828

Drilled by: C.W.Varner, Dubuque Date Sept Dec 1938 - Feb. 1939Total Depth: 1305 Curb Elevation: 1166' Static Level

No.	Description of Formations	Thick	From	To
PLEISTOCENE SYSTEM				
1.	Soil, dark brown, slightly sandy	3'	0	3'
2.	Drift, yellow buff, oxidized, unleached, silty textured	9'	3'	12'
DEVONIAN SYSTEM				
<u>Lime Creek Formation</u>				
3.	Dolomite, light to medium gray, fine sandy textured, moderately hard, with 0-1% pyrite	20'	12'	32'
4.	Shale, dolomitic, light gray, silty textured, structureless	8'	32'	40'
5.	Dolomite, light gray, fine sandy textured, hard	5'	40'	45'
<u>Juniper Hill Shale Member</u>				
6.	Shale, light gray, non-calcareous, structureless	30'	45'	75'
<u>Shell Rock Formation</u>				
7.	Dolomite, gray, drab mottled, translucent, coarsely crystalline, pyritic, becoming calcareous at base	13'	75'	88'
8.	Limestone, dolomitic, gray, subcrystalline, with bands of pure chalky white limestone	12'	88'	100'
9.	Dolomite, drab gray, mottled light brown, subcrystalline, hard, with trace of pyrite	10'	100'	110'
10.	Dolomite, drab, fine crystalline, translucent, with one thin band of dark brown dolomite	5'	110'	115'
<u>Cedar Valley and Wapsipinicon Formations</u>				
11.	Dolomite, gray to drab, fine granular texture, pyritic, with some free calcite	38'	115'	153'
12.	Limestone, light brown, medium to coarse crystalline, somewhat clastic textured, pyritic, some free calcite	6'	153'	159'
13.	Dolomite, calcareous, light brown to drab, with thin bands of limestone	11'	159'	170'
14.	Limestone, drab, fine crystalline, translucent	1'	170'	171'

Generalized Log Mason City Well Continued

		<u>Thick</u>	<u>From</u>	<u>To</u>
15.	Dolomite, drab to gray, mottled, medium to coarse crystalline	9'	171'	180'
16.	Dolomite, drab to gray, fine crystalline, porous in parts, pyritic	15'	180'	195'
17.	Dolomite, light brown and light gray interbanded, medium to coarse crystalline, with thin bands of subcrystalline gray dolomite	5'	195'	200'
18.	Dolomite, light brown and light gray interbanded, fine crystalline, hard, translucent	10'	200'	210'
19.	Dolomite, calcareous, light brown to drab gray, medium to coarse crystalline	5'	210'	215'
20.	Dolomite, calcareous, light brown to drab gray, fine crystalline, finely porous, with 3% clear calcite	10'	215'	225'
21.	Dolomite, brown, fine crystalline, hard, with occasional fine crystalline gray dolomite bands, traces pyrite	70'	225'	295'
22.	Dolomite, calcareous dolomite, and limestone interbanded, light brown, fine crystalline, translucent, with thin bands of gray dolomite	15'	295'	310'
ORDOVICIAN SYSTEM (?)				
Maquoketa Formation (?)				
23.	Shale, light gray, as well mud	6'	310'	316'
24.	Dolomite, drab to gray, fine crystalline, slightly porous	14'	316'	330'
25.	Dolomite, light gray, fine sugary texture	65'	330'	395'
<u>Galena and Platteville Formations (?)</u>				
26.	Limestone, drab to light gray, fine to medium crystalline, translucent, slightly pyritic	5'	395'	400'
27.	Limestone, brown to gray, fine crystalline, translucent	6'	400'	406'
28.	Dolomite, brown to gray, fine crystalline, translucent	3'	406'	409'
29.	Limestone, brown to buff, fine crystalline, translucent	4'	409'	413'
30.	Dolomite, pale buff to light gray, fine crystalline, translucent, traces of pyrite and clear calcite	12'	413'	425'
31.	Dolomite, drab to light brown, fine to medium crystalline, translucent	15'	425'	440'
32.	Dolomite, drab to gray, fine crystalline, translucent, with 50% white porcelain textured chert	20'	440'	460'

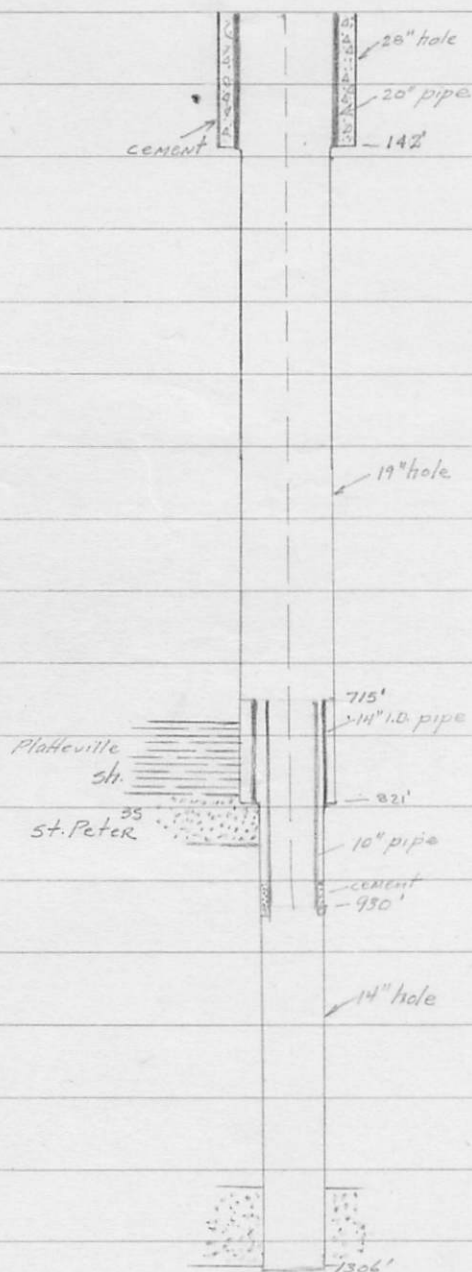
Generalized Log Mason City Well # 11 Continued

		<u>Thick</u>	<u>From</u>	<u>To</u>
33.	Chert, white, porcelain textured to very fine crystalline, with 20% drab to gray fine crystalline dolomite	35'	460'	495'
34.	Dolomite, drab, fine to medium crystalline, sugary textured	23'	495'	518'
35.	Limestone, light drab to light buff, fine crystalline white, floury and somewhat flaky textured, occasional partially dolomitized bands. 1-5% white to gray chert from 615'-700'. Traces of Galena in upper part.	222'	518'	740'
36.	Shale, light gray green, calcareous, with 30-40% soft white floury textured limestone bands, fossiliferous	21'	740'	761'
37.	Limestone, light buff, sub crystalline	4'	761'	765'
38.	Shale, light green to gray-green, soft, slightly fossiliferous, pyritic	25'	765'	790'
39.	Limestone, drab to buff, fine crystalline, hard	10'	790'	800'
40.	Shale, green, as chips, pyritic, some sand cemented by pyrite, with some black dol. conglom. in matrix of pyrite	15'	800'	815'
41.	Shale, buff to brown, in splintery chips	4'	815'	819'
42.	Limestone, light buff, fine crystalline	1'	819'	820'
<u>St. Peter Sandstone</u>				
43.	Sandstone, white, medium grained, well sorted, clean	10'	820'	830'
44.	Sandstone, light brown, medium to fine grained, slightly silty	10'	830'	840'
45.	Sandstone or sandy shale, light gray, as sandy well mud, sand medium	15'	840'	855'
46.	Sandstone, white, clean, fine grained, well sorted	10'	855'	865'
47.	Sandstone, with pink shale bands, shale as well mud	5'	865'	870'
48.	Sandstone, white, medium grained, clean, well sorted	5'	870'	875'

Generalized Log ^Mason City Well #11 Continued

		Thick	From	To
49.	Sandstone, light brown, medium grained, fair sorting <i>Willow River</i> <u>Shakopee Dolomite</u>	13'	875'	888'
50.	Dolomite, light buff to pinkish drab, fine crystalline, with band white oolitic chert at top, sandy in parts	12'	888'	900'
51.	Dolomite, drab, soft, calcareous, drills to flour, oolitic	20'	900'	920'
52.	Dolomite, drab, sub crystalline translucent and sandy <u>New Richmond Sandstone (?)</u>	10'	920'	930'
			Log to C.W. Varner - Aug. 14 '40	
53.	Sandstone, light buff, medium grained	4'	930'	934'
54.	Dolomite, drab to light buff sub-crystalline to fine crystalline, drills to rock flour between 934'-940', 950'-955', and 975'-980'	56'	934'	990'

Mason City
Well No. 11



142' 8" Monobly Cast Iron casing from 0 to 142' 8"

64' of 14" Monobly Cast. Iron casing from 713' 3" to 777' 3"

attached to

37' 1" of 16" (O.D.) Wrought Iron pipe from 777' 3" to 814' 4"

attached to

1' 11" steel shoe.

P R O P O S A L
CONSTRUCTION OF WELL
Mason City, Iowa

(Date)

To the City of Mason City
Mason City, Iowa

Gentlemen:

1. The undersigned, being familiar with the local conditions affecting the cost of the work, and with the Contract Documents and exhibits issued and attached to the Specifications, on file in the office of the City Clerk of Mason City, Iowa, hereby propose (s) to furnish all labor, materials, and equipment required for the construction of a well and to perform such work, all in accordance with the Contract Documents issued thereto for the following unit prices:

<u>Item</u>	<u>Unit Prices</u>	<u>Total</u>
a. Drilling approximately 150 feet of 26-inch hole, per foot	_____	_____
b. Drilling approximately 750 feet of 18 $\frac{1}{2}$ -inch hole, per foot	_____	_____
c. Drilling approximately 485 feet of 12 $\frac{1}{2}$ -inch hole, per foot	_____	_____
d. Setting and grouting approximately 150 feet of 20-inch casing per foot	_____	_____
e. Setting approximately 200 feet of 14-inch casing, per foot	_____	_____

f. Furnishing, installing and
removing test pump _____

g. Operating test pump
(estimated 50 hour) per hour _____

TOTAL CONTRACT SUM

(Based on above estimated quantities and
unit prices) _____

UNIT PRICES FOR CHANGES

(1). For continuing 12-inch hole downward through
the Dresbach sandstone from approximately 1385
feet below curb to approximately 1815 feet below
curb, estimated at 430 feet, per foot _____

(2). For shooting Jordan sandstone, per 50# shot _____

(3). For bailing in connection with shooting Jordan
sandstone, per hour _____

(4). For setting 8-inch threaded and coupled casing
in case it is required while drilling to Dresbach
sandstone, per hour _____

(5). For drilling a $7\frac{1}{2}$ -inch hole downward through
the Dresbach sandstone from approximately 1535 feet
below curb to approximately 1815 feet below curb,
estimated at 280 feet, per foot _____

The above "Unit Prices for Changes" are for the purpose of estab-
lishing a cost basis on unforeseen contract changes. The Owner reserves
the right to reject any or all the above "Unit Prices for Changes."

2. Accompanying this proposal is the Bid Security in the amount of
Five Per Cent (5%) of the Contract Sum, the same being subject to
forfeiture in event of default by the undersigned.

3. In submitting this bid it is understood that the right is reserved by the Owner to reject any and all bids, and it is agreed that this bid may not be withdrawn for a period of thirty (30) days from the date hereon.

4. The Bidder hereby certifies

- a. That this bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation;
- b. That he has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid;
- c. That he has not solicited or induced any person, firm, or corporation to refrain from bidding; and
- d. That he has not sought by collusion or otherwise to obtain for himself any advantage over any other bidder or over the Owner.

FIRM NAME _____

By _____

(Title)

Official Address

GENERAL SPECIFICATIONS

Article 1. Definitions. In this contract the following words are used in accordance with these definitions:

- a. "Engineer" means the Superintendent of the City's Water Department, acting personally or through a duly authorized assistant.
- b. "Contract Sum" means the amount determined by multiplying the unit prices specified in the proposal of the Contractor by the estimated number of such units, and is subject to change when the actual number of such units is found to vary from the estimated number.
- c. All time limits stated in the Contract are of the essence of the Contract.

Article 2. Execution, Correlation, and Intent of Documents. In case the City and the Contractor fail to sign the General Conditions, Drawings, or Specifications, the Engineer shall identify them.

All Documents are complementary, and what is called for by anyone shall be as binding as if called for by all. The intention of the documents is to include all labor, materials, and equipment for the work. It is not intended, however, that materials or transportation necessary for the proper execution of work not covered by, or properly inferable from any heading of, the specifications shall be supplied unless distinctly so noted on the drawings. Materials or work are described in words which, as applied, have held to refer to recognized standards.

Article 3. Contractor's Understanding. It is understood and agreed that the Contractor has satisfied himself as to the nature, character and location of the work; the conformation of the ground; the character, quality, and quantity of the materials to be encountered; the character of equipment and facilities needed preliminary to and during the prosecution of the work; the general and local conditions; and all other matters which can in any way affect the work under this Contract. Said Contractor agrees that he is not in any respect relying upon any representation made to him by any person in behalf of the City, but that he relies solely upon his investigation. No verbal agreement or conversation with any officer, agent, or employee of the City, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

Article 4. Reporting Errors and Discrepancies. If the Contractor in the course of the work finds any discrepancy between the plans and the physical conditions of the locality, or any errors or omissions in plans or in the layout as given by said stakes and instructions, it shall be his duty to inform the Engineer in writing immediately, and the Engineer shall promptly

verify the same and make corrections where they are required. Any work performed after such discovery, until authorized, will be done at the Contractor's risk.

Article 5. Materials, Appliances, Employees. Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary for the execution and completion of the work. Materials shall be of the quality specified for each particular part of the work.

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

Article 6. Lands for Work. The City shall provide the lands upon which the work under this Contract is to be done, except that the Contractor shall provide land required for the erection of temporary construction facilities and storage of his material, together with the right of access to same.

Article 7. Notices. The Contractor shall at all times keep on file with the City a written statement giving the name of each man then in charge of the work in progress, and any notice provided by this Contract to be served upon or given to the Contractor may be served upon or given to the person so named or served as hereinafter specified with the same force and effect as though served upon or given to the Contractor personally. Within 48 hours after a change of the man in charge is made, the Contractor shall file a written statement with the City notifying the City of said change. If said statement is not on file with the City, or the person named therein is not found upon the work, then any such notice may be served upon or given to the person in charge of any office used by the Contractor, or upon his foreman or agent at or near the work, or by depositing such notice in the United States Post Office, postpaid and registered, addressed to the Contractor at his last known place of residence.

Article 8. Rights of Various Interests. Wherever work being done by the City's forces or by other Contractors is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the Engineer, to secure the completion of the various portions of the work in general harmony.

Article 9. Stakes and Instructions. The Contractor shall provide reasonable and necessary opportunities and facilities for setting stakes and making measurements. The Contractor shall not furnish stakes or men to set them. He shall not proceed until he has received from the Engineer such stakes and instructions as may be necessary to the progress of the work.

The Contractor shall carefully preserve bench marks, reference points, and stakes, and in case of willful or careless destruction, he shall be charged with the resulting extra expense and shall be responsible for any mistakes that may be caused by their loss or disturbance.

Article 10. Protection of Work and Property. The Contractor shall protect all his work from damage and shall protect the City's property from injury arising in connection with this Contract. He shall make good any damage or injury except such as may be directly due to errors in the Contract Documents or caused by agents or employees of the City. He shall adequately protect adjacent property as provided by law and the Contract Documents. He shall provide and maintain all passageways, guard fences, lights, and other facilities necessary for protection of the work and the public.

In an emergency affecting the safety of life, or of the work, or of adjoining property, the Contractor, without special instruction or authorization from the Engineer, is hereby permitted to act, at his discretion, to prevent such threatened loss or injury, and he shall so act, without appeal, if so instructed or authorized. Any compensation claimed by the Contractor on account of emergency work shall be determined by agreement or arbitration.

Article 11. Inspection of Work. The Contractor agrees to complete the construction in strict conformity with the Contract, regardless of the extent or character of the inspection, but the Engineer and his representatives shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspections.

If the specifications, the Engineer's instructions, or any law, ordinance, or any public authority require any work or material to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection, and, if the inspection is by another authority than the Engineer, of the date fixed for such inspection. Inspections by the Engineer shall be made promptly and, where practicable, at the source of supply.

Article 12. Superintendence and Supervision. The Contractor shall keep on the work during its progress a competent superintendent and any necessary assistants, all satisfactory to the Engineer. The superintendent shall not be changed except with the consent of the Engineer unless the superintendent proves to be unsatisfactory to the Contractor or ceases to be in his employ. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor. Important directions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case.

The Contractor shall give efficient supervision to the work, using his best skill and attention. He shall carefully study and compare all drawings, specifications, and other instructions, and shall at once report to the Engineer any error, inconsistency, or omission which he may discover.

Article 13. Hiring City's Employees. The Contractor shall not employ any of the City's employees without the permission of the Engineer.

Article 14. Removal of Equipment. In the case of cancellation or termination of this Contract before completion, from any cause whatsoever, the Contractor, upon notice given by the City, shall promptly remove any part or all of his equipment and supplies from the property of the City, failing which the City shall have the right to remove such equipment and supplies at the expense of the Contractor.

Article 15. Assignment. Neither party to the Contract shall assign the Contract or sublet it as a whole or in part without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder without the previous written consent of the City.

Article 16. Status of the Engineer. The Engineer shall have general supervision and direction of the work. He has authority to stop the work whenever such stoppage may be necessary to insure the proper execution of the Contract. He shall also have authority to reject any work or materials which do not conform to the specifications, to direct the application of forces to any portion of the work as in his judgment is required and to order the force increased or diminished, and to decide questions which arise in the execution of the work.

Article 17. Engineer's Decisions. The Engineer shall, within a reasonable time, make decisions on all claims of the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the Contract Documents.

All such decisions of the Engineer shall be final.

Article 18. Cleaning Up. The Contractor shall, as directed by the Engineer, remove from the City's property and from all public and private property, at his own expense, all temporary structures, rubbish, and waste materials resulting from his operations before his work can be considered completed.

Article 19. Labor. Local labor shall be given preference so far as practicable.

Article 20. Completion Report and Objections Thereto. Within five days after the full completion of the work to be done under this Contract, the Engineer shall make a written statement of all work done by the Contractor hereunder, stating the quality of each item as found by him, and including a statement of all credits for extra work and all credits or debits for changes, alterations, omissions, and defects, and shall forthwith deliver a copy of such statement unto the Contractor. As soon as practicable, the Contractor shall compare such statement with his own records and shall then, in writing, either approve such statement or point out any claimed errors or omissions. If any such claims are found to be correct, the Engineer shall as soon as possible prepare a new statement, a copy of which shall in like manner be delivered unto the Contractor.

Before action by the City Council upon such completion report the Contractor shall also file a written statement of any claims he may have against the City, other than those shown by such completion report, growing out of this Contract or the work done hereunder.

Article 21. Waiver. By the execution of this Contract, the Contractor agrees that any objections he may have to the statement of the amount of work done hereunder included by the Engineer in his completion report and any claims of the Contractor against the City growing out of this Contract or the work done hereunder which are not stated in writing and within five days shall be waived, and no such claim thereafter be asserted against the City.

Article 22. Use of Proposal Form. Bidders will be furnished with proposal forms giving the description of the work, showing the approximate estimates of the various quantities of work to be performed, the time at which the work must be completed, and the amount of the proposed guaranty which must accompany the proposal -- all of which must be in accordance with the official publication relating to the proposed improvements. To insure against accidental errors, the Contractor should read carefully the official publication before preparing his proposal.

Article 23. Estimate of Quantities. The estimate of quantities submitted here is approximate only, and is to be used only as a basis for comparing the bids. The estimate of quantities has been carefully checked and is believed sufficiently accurate for the purpose, but it is not guaranteed that the final measurements will show the exact quantities that appear in this estimate.

Article 24. Preparing the Proposal. In preparing his proposal, the bidder shall specify the unit price, written legibly in ink or with typewriter, at which he proposes to do each item of work. The unit price shall be stated in figures and the total amount of each item shall be computed at the unit price bid for the quantities given in the estimate.

Article 25. Award of Contract. Contracts will be awarded at the time and place indicated in the advertisement or, if deemed advisable, at a time and place to be fixed by the Council at the time of opening proposals.

Article 26. Increase or Decrease of Quantities. The right is reserved, without impairing the Contract, to order the performance of such work, of a class not contemplated in the proposal, or increase or decrease the quantities by such amount as may be considered necessary to complete in a satisfactory manner the work included in the Contract.

Article 27. Indemnity: Liability Insurance. The Contractor shall indemnify and save harmless the City from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against him or the City, by reason of any act of omission or claimed act of omission, of the said Contractor, his agents or employees; in the execution of the work or in the guarding of it. In case any claim made or suit brought against the City, based upon any act or omission of the Contractor the City shall promptly give notice of such fact to the Contractor.

The Contractor shall maintain such insurance as will protect him from claims for damages for personal injury, including death and damage to property, which may arise from operations under this Contract, whether such operation be by himself or by any sub-contractor or anyone directly or indirectly employed by either of them. Certificates of such insurance shall be filed with the Engineer and shall be subject to his approval for adequacy and protection.

The Contractor shall, and is hereby authorized to maintain and pay for such insurance, issued in the name of the City, as will protect the City from his contingent liability under this Contract, and the City's right to enforce against the Contractor any provision of this article shall be contingent upon the full compliance by the City with the terms of such insurance policy or policies, a copy of which shall be deposited with the City.

Article 28. Bond. At the time of the execution and delivery of this contract by the Contractor, and before this Contract shall be valid or effective, the Contractor shall furnish and deliver unto the City a construction bond, conditioned upon the faithful performance by the Contractor of all the covenants and agreements on the part of the Contractor contained in this Contract, including the giving of a bond for maintenance of the work done hereunder for the specified term and in the penal sum mentioned in said contract (if such maintenance be required by said Contract). Said construction and maintenance bonds shall be in form and substance acceptable to the City, and shall be executed by one or more sureties satisfactory to the City, unless security be furnished as allowed under the provisions of Section 10302 of the Code of Iowa, 1924. Said construction bond shall be in the penal

sum not less than that specified in the official published notice to Contractors, if a sum be therein mentioned, otherwise shall be in the penal sum provided by law for contracts of this character.

DETAILED SPECIFICATIONS

CONSTRUCTION OF WELL

Mason City, Iowa

1. Location. The well will be located on a tract of land on the west side of South Federal Avenue opposite Twenty-first Street Southeast in the City of Mason City, Iowa. The Contractor should acquaint himself with the location and the ground conditions which might affect his work. No allowance of any kind will be granted because of lack of knowledge of such conditions.

2. Anticipated Log of Well. Approximate curb elevation - 1165'

<u>Description</u>	<u>Thickness (In feet)</u>	<u>From (Below Curb)</u>	<u>To (Below Curb)</u>
Soil and Shattered Rock	17	0	17
Limestone Shattered Near Top	13	17	30
Hackberry Shale with Limestone Streaks	48	30	78
Dolomite or Limestone	170	78	248
Shale & Dolomite (Maquoketa)	92	248	340
Dolomite & Limestone with Shale Bands (Galena-Plattsville)	402	340	742
Shale - (Glenwood)	47	742	789
St. Peter Sandstone	99	789	888
Dolomite with Bed of Sandstone near middle (Prairie du Chien)	337	888	1225
Jordan sandstone	60	1225	1285
Limestone	150	1285	1435

DETAILED SPECIFICATIONS

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Description	Thickness (In Feet)	From (Below Curb)	To (Below Curb)
Shale	100	1435	1535
Sandstone	75	1535	1610
Limestone	60	1610	1670
Shale (Red)	100	1670	1770
Dresbach	45	1770	1815

3. Construction of Well. The well will be started with a 26-inch hole which will be carried to an estimated depth of 150 feet below curb. The 20-inch O.D. casing will then be accurately centered in the hole. The casing will be plugged in the bottom and piping so arranged through this plug that neat Portland cement grout can be pumped around the casing from the bottom up. Grouting shall be carried on continuously until the grout rises to curb elevation. No further work shall be done on the casing for a period of at least seventy-two hours.

The plug in the bottom will then be drilled out and the hole drilled downward 18 $\frac{1}{2}$ inches in diameter into the rock immediately below the St. Peter sandstone which will be at an estimated 900 feet below curb. As it is expected some trouble may be experienced going through the Glenwood shale from about 740 to 790 feet below curb, the contractor will be required to drill continuously twenty-four hours per day from the top of the Glenwood shale to the bottom of the St. Peter sandstone.

When sufficient rock cuttings show to be certain the bottom of the St. Peter sandstone has been reached, the Contractor will immediately set the 14-inch O.D. casing. This will be set from the bottom of the hole up

to a point not less than 20 feet above the top of the Glenwood shale. This work will also be done on a twenty-four hour basis in an effort to avoid difficulties due to caving of the Glenwood shale.

After this casing is set the hole will be drilled downward $12\frac{1}{2}$ inches in diameter into the rock below the Jordan sandstone. It is anticipated that the St. Lawrence formation will be drilled at least 100 feet below the bottom of the Jordan sandstone. This will place the bottom of the hole approximately 1385 feet below curb. A pumping test will then be run on the well. If, in the opinion of the Engineer, this test shows an insufficient supply of water, he may order one or more of the following procedures:

a. The hole $12\frac{1}{2}$ inches in diameter shall be continued downward through the Dresbach sandstone, the bottom of which is estimated to be 1715 feet below curb. In case caving shales are found above the Dresbach Sandstone, these shall be cased out, before drilling to the Dresbach Sandstone, with 8-inch well casing which will be furnished by the City and the hole continued $7\frac{1}{2}$ inches in diameter through the Dresbach Sandstone.

b. The Jordan sand will be shot and bailed out as ordered by Engineer.

c. In case procedure (a) above is carried out first and the results prove unsatisfactory in the opinion of the Engineer, he may order the Jordan Sand shot and then may require the placing of a plug adequate to shut off all waters below the Jordan sandstone.

4. Accuracy of Log and Casing Locations. While great care has been used in anticipating the log of the well, the City assumes no responsibility for its accuracy. The Engineer may order changes in the estimated lengths and locations of casing specified above as, in his opinion, conditions warrant such changes.

5. Contractor's Responsibility. The Contractor shall furnish proper tools and equipment for the construction of the well in a workmanlike manner and shall be responsible for any loss of tools that he may have on

any count whatsoever, including extra work. He shall protect the well at all times in such manner that any foreign particles shall not be thrown or dropped into the well. He shall provide adequate lights and barricades around the well and equipment for the protection of the public against accident or injury.

6. Contractor's Representative. The Contractor shall have an experienced Foreman or Driller at the well site in charge at all times. Instructions given by the City to the Contractor's Foreman or Driller shall be considered as having been given to the Contractor.

7. Work and Materials Included. The work under this Contract shall include furnishing and transporting of equipment, tools, materials, temporary casing, couplings, shoes, drive heads, test pumping equipment, etc., required for the drilling, casing, testing and proper finishing of a well of the dimensions in accordance with the specifications, except as hereinafter specified.

8. Samples and Records. Sample sacks, Driller's record book, and instructions for the collecting and handling of drill cuttings will be furnished by the City. The Contractor shall save a sample of cuttings from every five (5) feet, or of each formation if the formation is less than five (5) feet thick, and shall place same in sacks properly labeled. The sacks shall be completely filled with the sample and taken from the bailer and not from the sluice box or pit. The Contractor shall keep a detailed and accurate log and shall note in the drill record book the amount and depth of any openings or soft or broken ground encountered, and the depth at which water is encountered; the static water level and any changes in

Detailed Specifications

water level during the drilling operations; the sacks containing the cuttings shall be sent to the Iowa Geological Survey at Iowa City by express collect once a week, or more often if desired by the Engineer. On completion of the well, the Contractor shall forward to the Iowa Geological Survey all samples not previously submitted and the Driller's record book.

9. Daily reports. The Contractor shall report in writing to the Engineer at the end of each day the nature of the work done, the depth and size of the hole, the water level, the kind of samples, and the casing installed, if any,

10. Provision for Fuel and Power. The Contractor shall provide and pay for all installation and transportation of fuel, electricity, steam, compressed air, or other forms of power, light for all parts of the construction and equipping of the well as required in the contract, except that the City will furnish electric power, at a pressure of 2300 volts, at the site of the well for the purpose of providing power for the test pump during tests.

11. Provision for Water. The City will furnish a 3/4-inch water supply line from the City mains at the site and will supply necessary water without charge to the Contractor, but storage tanks or further fittings including hose required will be furnished and installed by the Contractor.

12. Casing. Permanent casing and shoes will be furnished by the City at the site but all labor and materials for the proper welding and installation of the casing will be furnished by the Contractor at the price bid per lineal foot for installing casing. The City intends to supply

150 feet of 20-inch O. D. x $\frac{1}{2}$ -inch wall, black steel pipe with beveled ends in random lengths and approximately 200 feet of 14-inch O.D. x $\frac{1}{2}$ -inch wall, black steel piping with beveled ends in random lengths. The City also intends to furnish two drive shoes for the 14-inch casing.

13. Grouts. All grout shall be neat Portland cement and shall be placed or pumped into place in such manner that it does not at any time fall through open water.

14. Test Pump. The Contractor will be required to furnish a test pump with at least 300 feet of column, capable of delivering 1500 gallons per minute with an operating head of 300 feet. He shall also provide satisfactory and accurate device for measuring the discharge during the tests, and also a device for making frequent accurate measurements of the operating head during tests.

15. Pumping Tests. All pumping tests shall be run as directed by the Engineer. It is not expected that any tests will be run of less than 24 hours' duration. The hourly price bid for tests will be considered to cover the time of running the test only. The unit price bid for installing and removing pump shall cover all pump charges except the actual hourly charge while running the test.

16. Alignment. The well hole must be plumb throughout, without wind or deviation, and, as it is expected that there will be a possible pump setting at least 300 feet below the surface, it is exceptionally important that the well shall be drilled straight and plumb for this distance. If deemed necessary by the Engineer, the Contractor will be

required to prove the straightness of the well to this depth by lowering a dummy 40 feet long and 17 $\frac{1}{2}$ inches in diameter into the well for the required distance.

17. Measuring Well. The Contractor shall provide and operate a steel measuring line, marked in feet, of sufficient length to measure the total depth to be drilled. Accurate measurements of depth by the use of this tape shall be taken at least every hundred feet, or more often if requested by the Engineer. All depth measurements shall be related to stakes as set by the Engineer.

18. Shelter. The Contractor shall provide shelter as needed for workmen, machinery, equipment, and tools.

19. Sluice Box. The Contractor shall maintain a sluice box with high sides and sufficient length to direct the bailings away from the well, so that the area immediately adjacent to the well will be kept neat and clean. The City will provide for removal of the bailings as necessary.

20. Extra Work. In general, the unit price bid shall cover all costs to the City and no extra of any kind will be allowed, unless ordered in writing by the Engineer.

21. Stopping Work. It is anticipated that in case the well is drilled through the Dresbach Sandstone, it will be necessary to suspend operations on the well for one week to allow a complete analysis of the water. Operations may be stopped at any time by the Engineer, if, in his opinion it is necessary to protect the City's interests.

22. Completion. Before removing the machinery from the site of the well, the Contractor shall make sure that all accumulations of materials have been removed from the well, and before acceptance of the well by the City, he shall remove all rubbish and unused materials of all kinds from the premises and leave them clean and orderly.

C O N T R A C T

CONSTRUCTION OF WELL
Mason City, Iowa

THIS AGREEMENT made and entered into as of the ____ day of _____ 1947, by and between _____ hereinafter called the "Contractor", and _____ hereinafter called the "Owner".

WITNESSETH: That the Contractor and the Owner for the consideration stated herein agree as follows:

ARTICLE 1. SCOPE OF WORK.

The Contractor shall furnish all of the materials and perform all of the work shown on the drawings and described in the specifications entitled "Detailed Specifications for Construction of Well", prepared by C. B. Patchen, acting as, and in these contract documents entitled the "Engineer"; and the Contractor shall do everything required by this agreement and the Contract Documents.

ARTICLE 2. COMMENCEMENT AND COMPLETION OF WORK.

The commencement of work is dependent upon the delivery of casing to be furnished by the City and the Contractor agrees to commence work within twenty (20) days of written notification by the Owner that casing is available at the site. The Contractor shall carry on the work continuously during all normal working hours and complete all work hereunder within two hundred (200) consecutive calendar days from the date of commencement.

ARTICLE 3. THE CONTRACT SUM.

The Owner shall pay the Contractor for the performance of this Contract, subject to deductions provided, herein, in current funds as follows:

<u>Item</u>	<u>Unit Prices</u>	<u>Total</u>
a. Drilling approximately 150 feet of 26-inch hole, per foot	_____	_____
b. Drilling approximately 750 feet of 18 $\frac{1}{2}$ -inch hole, per foot	_____	_____
c. Drilling approximately 485 feet of 12 $\frac{1}{2}$ -inch hole, per foot	_____	_____
d. Setting and grouting approximately 150 feet of 20-inch casing, per foot	_____	_____
e. Setting approximately 200 feet of 14-inch casing, per foot	_____	_____
f. Furnishing, installing and removing test pump	_____	_____
g. Operating test pump (estimated) 50 hours) per hour	_____	_____

TOTAL CONTRACT SUM

(Based on above estimated quantities and unit prices _____)

UNIT PRICES FOR CHANGES

- (1). For continuing 12 $\frac{1}{2}$ -inch hole downward through the Dresbach sandstone from approximately 1385 feet below curb to approximately 1815 feet below curb, estimated at 430 feet, per foot _____
- (2). For shooting Jordan sandstone, per 50# shot _____
- (3). For bailing in connection with shooting Jordan sandstone, per hour _____
- (4). For setting 8-inch threaded and coupled casing in case it is required while drilling to Dresbach sandstone, per hour _____
- (5). For drilling a 7 $\frac{1}{2}$ -inch hole downward through the Dresbach sandstone from approximately 1535 feet below curb to approximately 1815 feet below curb, estimated at 280 feet, per foot _____

ARTICLE 4. PAYMENT.

Not later than the 15th day of each calendar month, the Owner will make partial payment to the Contractor on the basis of a duly certified approved estimate of the work performed during the preceding calendar month by the Contractor, but the Owner will retain 25 per cent of the amount of each such estimate until thirty days after final completion and acceptance of all work covered by this contract.

ARTICLE 5. CONTRACT DOCUMENTS.

Contract Documents shall consist of the following component parts:

1. The Accepted Proposal
2. General Specifications
3. Detailed Specifications
4. This Instrument

This Instrument, together with the documents hereinabove mentioned, form the Contract and they are as fully a part of the Contract as if hereto attached or herein repeated. In the event that any provision in any of the component parts of this Contract conflicts with any provision of any other component part, the provision in the component part first enumerated herein shall govern, except as otherwise specifically stated.

IN WITNESS WHEREOF, the parties hereto have caused
this Instrument to be executed in four original counterparts as of
the day and year first above written.

Countersigned:

(SEAL)

Attest:

(Contractor)

By _____

(Name of Public Body)

By _____
