MASTER CARD-A

9-26-69
RP 1-26-73

STATE	COUNTY	LATITUDE DEG.	LATITUDE MIN	LATITUDE SEC	LATITUDE N. or S	LONGITUDE DEG.	LONGITUDE MIN.	LONGITUDE SEC.	SEQ. NO.
1 2	3 4	5 6	7 8	9 10	11	12 13 14	15 16	17 18	19
19	64	41	56	40	N	093	06	21	1

WELL SCHEDULE

US GEOLOGICAL SURVEY

IOWA DISTRICT WRD

WELL NO. 082-19W-06 ACCB CO. Marshall

OWNER Melbourne City Well ADDRESS Melbourne

DRILLER McCutcheon DATE DRLD May 8, 1939

MAP

SOURCE OF DATA FILE

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

CONTINUED FROM ABOVE	ACCURACY	LOCAL WELL NUMBER T	R.	E/W	SEC.	QUARTERS	LOCAL USE W-NUMBER	OPTIONAL	OWNER OR NAME	OWNERSHIP	WATER USE	WELL USE	WELL DATA	FREQ. W/L	FIELD CHAR.	HYD. LAB.	QW-DATA	QW-FREQ.	PUMPAGE	APERTURE	LOG DATA	CARD DESIG.
	20	21 22 23	24 25	26	27 28	29 30 31 32 33 34	35 36 37 38 39	40 41 42 43 44 45 46 47 48 49 50 51	52 53 54 55 56 57 58 59 60 61 62 63 64 65 66	67	68	69	70	71	72	73	74	75	76	77	78 79	80
	2	082	19	W	06	ACCB	00908	//	MELBOURNE	M	P	W		Ø			C	I			G	A

WELL-DESCRIPTION CARD - B

DUPLICATE CARD A CC 1-19	DEPTH OF WELL	ACCURACY	DEPTH CASED OR FIRST PERF.	DIAM. INCHES	WELL FINISH METH. DRILLED	YEAR DRILLED	PUMP SETTING	METH. LIFT	DEEP/SHALLOW	POWER	ALTITUDE OF LSD (FEET)	ACCURACY	WATER LEVEL (FEET)	ACCURACY	DATE MONTH	DATE YEAR	YIELD OF WELL (GPM)	METH. DET.	DRAWDOWN (FEET)	ACCURACY	PUMPING PERIOD (HOURS)	QUALITY OF WATER IRON	SULF.	CHLOR.	HARD	SP. COND.	TEMP.	DATE SAMPLED	CARD DESIG.
	20 21 22 23	24	25 26 27 28	29 30	31	32 33 34 35	36 37 38	39	40	41	42 43 44 45 46	47	48 49 50 51	52	53 54 55		56 57 58 59 60	61	62 63 64	65	66 67 68	69	70	71	72	73	74 75 76	77 78 79	80
	1340	3	1212	10	X	939					10507		2020	D	53	9	95		17	3									B

HYDROGEOLOGIC CARD - C

DUPLICATE CARD A CC 1-19	PHYS-IOG-RAPHY PROV.	PHYS-IOG-RAPHY SEC.	DRAINAGE BASIN	SUBBASIN	TOPO SETTING	MAJOR AQUIFER SYSTEM	SERIES USGS	SERIES IGS	UNIT	LITH-OLOGY	ORIG.	THICK-NESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	MINOR AQUIFER SYSTEM	SERIES USGS	SERIES IGS	UNIT	LITH-OLOGY	ORIG.	THICK-NESS	LENGTH WELL OPEN TO	DEPTH TO TOP OF	DEPTH TO CONSOLI-DATED ROCK	SOURCE	DEPTH TO BASEMENT	SOURCE	SURF. MAT. LITH-OLOGY	SURF. MAT. INFIL.	COEF. TRAN SIG FIG	COEF. TRAN XIO	COEF. STOR SIG FIG	COEF. STOR XIO-	CARD DESIG.
	20 21	22	23 24 25	26	27	28	29	30	31	32 33	34	35 36 37	38 39 40	41 42 43	44	45	46	47	48 49	50	51 52 53	54 55 56	57 58 59	60 61 62 63	64	65 66 67 68	69	70 71	72	73 74	75	76 77	78	79	80
	12	E	25	C		S		X		QD	6	75	75	A23										18	C			T	4						C

CASING AND SCREEN (SIZE, TYPE, INTERVALS):

1230

40' of 16" steel liner 0-40'.

208' of 10" G.W.I. casing grouted

Top 100'.

457' of 8" G.W.I. casing 199-656'.

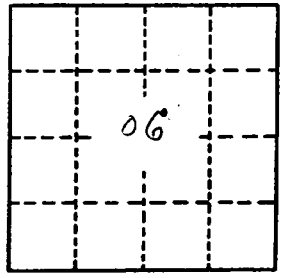
556' of 6" std. steel casing 656-1212.

CODED BY Enwerkoff DATE 7-25-74

PUNCHED BY Allaire DATE 91774

VERIFIED BY DATE

SKETCH ON REVERSE: YES NO



WELL NO. 082-19W-06 ACCB

June 7, 1939

Mr. A. H. Wieters, Director
Division of Public Health Engineering
Department of Health
Des Moines, Iowa

Dear Mr. Wieters:

Your letter of June 5 concerning the Melbourne project reached me today.

Although the well penetrated the Maquoketa shale for some distance at the present depth of 1340, the horizon from which the major portion of the water is coming is the Silurian, immediately above the Maquoketa. Water from this aquifer is notably hard wherever found, and at Melbourne it is an exceptionally large producer.

The next lower aquifer that gives any assurance of producing an appreciable quantity of water is the St. Peter sandstone, the top of which I would expect at approximately 1745 feet. In the area around Melbourne the St. Peter is not a large producer. I would not expect more than 50 g. p. m. and possibly much less. The static level, according to our best information would be about the same as that in the well as it stands at present, but I believe that the pumping level would be lower. The quality of the water from the St. Peter as shown by the Reed Ice Cream well in Des Moines is somewhat better than that now in the Melbourne well, but it is still hard and high in sulfates and iron.

The next promising aquifer beneath the St. Peter is the Jordan sandstone which our structure map shows at a depth of about 2325 feet or about 985 feet below the bottom of the present hole. The quantity of water from this source would be more than sufficient for the supply needed, the static and pumping levels would compare favorably with the Silurian water. According to the analysis of water from the Jordan in the Woods Brothers well at Des Moines the quality of Jordan water should be somewhat better than that from the St. Peter, but still

very high in iron and sulfates. On the other hand, deeper water from Ogden, Newton, and Grinnell indicate the possibility of better water at Melbourne.

I have talked to Mr. H. R. Green about this situation and you may wish to do the same. It did not appear practicable to Mr. Green to continue drilling to the St. Peter because of the possibility of only slight improvement in water quality, the probability of increased pumping cost and the possibility of an insufficient supply. I agreedwith Mr. Green in this although I also agree with you that there are good arguments for deeper drilling. The chief objections to continuing to the Jordan are the cost and the mechanical difficulties of carrying the hole to the necessary depth.

Mr. Green was investigating the possibility of individual water softeners for Melbourne users, but I do not know what results he obtained.

It is difficult to cover a problem of this kind adequately by letter. Unfortunately, I cannot leave Iowa City for any appreciable time this month. I am wondering if you expect to be in the vicinity of Iowa City in the near future and if we could get together here, possibly with Mr. Green, to talk the situation over at more length.

Very truly yours,

HGH:LM

H. G. Hershey

WALTER L. BIERRING, M. D.
COMMISSIONER

State of Iowa
Department of Health
Des Moines

DIVISION OF
PUBLIC HEALTH ENGINEERING
AND INDUSTRIAL HYGIENE

June 5th, 1939.

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

Dear Dr. Hershey:

By this time you no doubt have seen a copy of the mineral analysis of a sample of water collected by Mr. Schuldt from a new well at Melbourne. We do not appear to have any of the information on the well, but I am wondering if there is not a possibility of going deeper and securing a more desirable water.

It has been our experience where a water with such high iron content and as hard as this is developed very few of the people will connect to the system and use the water for drinking and domestic purposes. I do not believe this water should be developed unless every possibility of securing a better water has been exhausted. Your opinion in this matter would be very greatly appreciated.

Very truly yours,

A. H. Wieters, Director,
Division of Public Health Engineering.

AHW:M

Melbourne, Marshall Co.
Town Well

April 14, 1939

Meeting at request of H. R Green who was present with Mr Corbett & two other councilmen

Driller reported to have said Maquoketa caving

15' of rock [bottom 12-15' now in 8" hole

MARSHALL

Melbourne, Marshall Co. – City Well – Drilling
City Well - Started Oct.
NWSWSW NE Sec 6 T. 82N R 19 W, Logan Twp. Nov. 9, 1938

Melbourne	C.M&St.P	12:50	8.92	139	1031	
"	City Well	12:59	9.01	135	1036	out
"	C.M&St.P	1:04	8.98	133	1031	
"	City Well	1:12	9.19	130	1049	
"	C.M&St.P	1:17	9.02	129	1031	
"	Well	1:23	9.23	127	1050	

By hand level to center rail on overpass then down 26.95
26.95 - 5.5 = 21.45' to curb from top of rail
1031 + 21.5 = 1052.5
"S.W.L = 16.35' below ground surf." T.W.R. Depth 81'
10" W.I casing to be used. Water came in at 50-55
Bone dry to 50'

Schoolhouse Well
SW¼ NW¼ NE¼ SE¼ Sec 6 T82N R 19W, Logan Twp

Councilman: H.K. Corbett aff'd says

T.W. Robinson's alt. readings average 1050.5 } Temp. Carb el 1050'
My " " " 1049.5 }
Measurement from overpass 1052.5 }

Marshall 60

August 23, 1949

Mayor Al Sanderman
Melbourne,
Iowa

Dear Mayor Sanderman:

Enclosed is a report on the mineral analysis of water from the 1340-foot town of Melbourne well as shown by a sample collected by Mr. C. W. Lane on July 18, 1949.

If you have any questions concerning this report, please do not hesitate to let me hear from you.

Very truly yours,

H. G. Hershey

HGH:AEH
Enc.

Melbourne, (Marshall) – Mr. Frank Becker, Mayor A38.
E½+, Sec 6, T 82 N, R 19 W Logan Twp.

Pre-field Study. Data.
C.G.W. elev = 1045 Also sec crossing elevs.
C.M & St.P " = 1031

No Major stream near. – No topog. map.

Geology
Wisconsin drift just to W. but not in Melbourne
Kansan drift at surface – in topog. maturity
Nebraskan
Des Moines series
Shales & some sandstones.
Kinderhook series
Thin shales (Top) Heavy ls. & thin ls. & shales. (Total 150'±

< Water (?)

Drift on upland 100'-200' (Max 400 reported in Co.)
Aftonian gravels reported 30' thick locally
Drift wells form major supply of county
Nebraskan too vague & indefinite

Wells finished in Des Moines rare.
State Center
Aftonian not good producer at State Center
Quicksand & mud above shales of Des M.

Rhodes & Melbourne
Chiefly shallow wells
Aquifers 150, 200, 250 last which underlies is flowing in places but is min. like Colfax Water (May be St. Louis)

Brick yard at Melbourn 230' deep.
Poffenberger & Walker NE¼ Sec 5 (TD. 231, Rx 190, SWL -130
Wm. Fort NE¼ Sec. 1 (TD 258, Rx 205, SWL. -150
St. Peter 1800'±

Town Well at Rhodes 300' in sand 95' thick underlying clay Driller E. A. Ford, Marshalltown. Elev. 1011

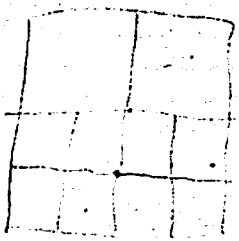
Melbourne (Marshall) Cont

Pre-Field study Forcast

Assumed elev. of 1040

	Elevations			
	Top	Bott.	Thick.	Depth
Kansan	1040			
Aftonian				
Nebraskan				190
Des Moines				265
U. Kinderhook				570
Maple Mill				690

1040
- 570
470



W½ - NE-SE¼; Sec 6 T82N R19W

Melbourne (Marshall)
Field Investigation

Feb. 21, 1938

Numerous shallow wells 40 - 45' deep (Private)
Going dry

Schoolhouse Well
John Verwers of Sully - driller 1930
405 ft. T. D.
NE¼ SE¼ Sec 6, T82N R19W

5" hole Drilled for 40 gpm.

Council Meeting

W S Cooper.
F F De Butts.
R H Filers.
H. K Corbett.
F A Witt.
} School board at time of drilling

Witt
Ekent
Pedemeyer
$20

Water at 250'
Cylinder 2" dia at 280'

5" casing from surface to bottom (perorated)
pumping 7 gpm.

John N. Martin

June 6, 1938

Mr. Howard R. Green
208-209-210 Bever Building
Cedar Rapids, Iowa

Dear Mr. Green:

Your letter of June 2 regarding underground water possibilities at Melbourne was on my desk this morning when I returned after an absence of a week. Following is a report based on the information in our files and a short field investigation which I made at Melbourne on February 21, 1938.

Kansan drift is at the surface at Melbourne. The Wisconsin drift which prevails to the west does not quite reach the town. Below the drift are formations of the Pennsylvanian system consisting of shales with some thin limestone and sandstone. Beneath the Pennsylvanian are rocks of the Kinderhook series of the Mississippian system composed of heavy limestone overlain by thin shales and underlain by thin sandstone and shales.

The water producing value of these rocks at Melbourne is rather vague, and because we have no samples or logs from any of the wells that have been sunk in the near vicinity, the depth forecasts must be used with caution. Numerous private wells in the town obtain water from what appears to be the Aftonian or loess at depths ranging from 40-45 feet. It is possible that a shallow well could be developed in this or in a deeper glacial formation. Water from this source will be the softest and best available for this use. A mineral analysis is attached showing the composition of water from a 43-foot private well.

It may be worth while to drill one or more test wells to bed rock in order to ascertain the true characteristics of the drift, although the fact that some wells in the vicinity are finished in consolidated formation makes the drift appear to be a poor producer.

Wells in the Pennsylvanian are rare in Marshall County and where developed they usually produce a highly mineralized and unsatisfactory water.

The best possibilities of obtaining a water supply for Melbourne is from the Upper Kinderhook series. Water from this source would be hard but would be better than that from the Pennsylvanian. The Lower Kinderhook is made up of Maple Mill shale which is dry and approximately 100 feet thick. I estimate the top of the Maple Mill at approximately 500 feet at Melbourne and believe that an adequate water supply can be obtained above that point.

Enclosed is an analysis of the water from the Melbourne school well. We do not have a casing record or log of the well but water is reported from 250 feet which is interpreted as basal Des Moines (Pennsylvanian) and from the Kinderhook below. The analysis probably represents a mixture of Pennsylvanian and Mississippian waters.

Additional field work would undoubtedly bring new facts to light. At present, however, I have commitments which prevent my visiting Melbourne, but I will be glad to do the additional field work as soon as possible if you desire it.

Very truly yours,

HGH:LM

H. G. Hershey

Sheet No. 1 Name of Well *Melbourne City Well (Marshall Co)* Survey No. *W-0908*

Location *NW¼, SW¼, SW¼, sec. 6, T 82N, R 19W* Date Drilled ______ Analyst *Schuldt*

Curb Elev. 1050' ± 1½' *12/15/38 –*

Depth	Description
00–10	Drift, silt, buff, calc., oxidized, brown spots of org. orig. no pebbles.
10–20	Drift, silt & sd, buff, oxidized, calc.; sd cont. consid cht. & feld. & Ig. mat. ½–¼ mm
20–30	Drift, lt. gray, firm, silt, non-calc., slightly sandy.
30–40	Drift, lt. gray to yel. gray, structureless, med. soft, non-calc., with consid. med. to crse qz sd. & some soft, wh. taxline mat (weath. Feld, or Gyp. – soft, with worm. borings
40–47'	Drift, sim. to sple. 30–40'
47'–55	Drift, lt. buff, sdy, with occas. gran. of Ig. mat., i.e. greenstone. mod. to strongly calc., oxidized.
55–65	Drift, lt. buff, sdy, oxidized, strongly calc., occas. sm. pebbles, 1 lg pebble wh weath. chert. sim. to sple 30–40
65–75	Drift, gray, crse. sdy, with gr. of Ig. mat. & bs. calc., unoxidized, micac.
75–85	Drift, " " " " rare " " " " " " non calc " , strongly micac
85–90	Drift, " " " with gr. " " " " " calc., " , micac., 1 frag. coal.
90–95	Drift, " " " " , " " " " " , " , "
95–100	Drift, " " " " numerous " " " " " " " , " , "

Sheet No. 2 Name of Well Melbourne City Well Survey No. W-0908

Location Marshal Co. Date Drilled Analyst Schuldt

/00 Drift, gray, micac, crsesdy to gran. Ig. Mat., calc., dense, sim. to spls. 95-100.

Drift, " " " " 9 " " " 96s, " " " " " " " -11.

/10 Drift, " " , " " 9 " " " " , " " " " " " " -11

Drift, " " , " " " " " " " " " " " " " " " " .

/20 Drift, " " " " " " " " " " " " " " " " " " .

Drift, " " " " " " " " " " " " " " " " " " .

/30 Drift, gray, sim. to spls 100-105'

Drift, " " " " " " -" .

/40 Drift, " " " " " " -" .

Drift, " " " " " " -" .

/50 Drift, " " " " " " -" .

Drift, " " " " " " -" . some Wh. g lt. buff silty drift.

/60 Drift lt. buff, oxidized, leached, with num. granules g sm. pebbles Ig. Mat.

Reworked Penn.

Drift, buff to drab, leached, occas. ig frag., num. frag. sh.

/70 Reworked Penn,

Drift, gray, , noncalc., ig. mat. uncommon, num. frag. sh., some blk. sh prtings

Reworked Penn.

Drift gray, " " " common (Cave ?), or drift with num. sh. prtings

Pleistocene

Reworked Penn.

Penn /80 Shale gray, sim. to spls. 175-180

Shale, gray g lt. gray, noncalc., no ig. mat.

/90 shale, " " " " , " " , " " " " .

Shale, " " " " , " " , " " " " .

200

Sheet No. 3 Name of Well. Melbourne City Well Survey No. W-0908

Location Marshall Co. Date Drilled Analyst Schuldt

200 Shale, lt. gray, non calc., no Ig. Mat.

205 Shale, med. gray to lt. gray to drk. gray, non-calc., soft, with 5% dull to vit. coal, sh. pyritic
Coal Band 207' (Drillers log)

210 Sh, V. lt. grn, homogen., no struct, with finely dissem. pyrite, 60%; 10% med. gray sh, strongly calc.
Ls, v. lt. gray, fine xline, mod. soft, strongly calc. 30%

215 Ls, V. lt. gray, fine xline, mod. soft, strongly calc., a
sh, v. lt. grn, v. strongly calc., structureless, homogen.; pyrite, 5%.

220 Ls, lt. buff to lt. gray, sim. to ls sple. 215-220' <1% sh.

225 Ls, " " " " " " " " " " " , pyritic, 10%
Dol., lt. drab to lt. br. fine xline (text. sim. to ls. text.), slowly efferv., 90%; <1% Br. Cht.

230 Dol., " " , sim. to dol. sple 225-230', 1 frag. coal (cave). Pyrite <2%

235 Dol., lt. buff, br., med. to drk gray, sandy, dol. all fine xline, (mottled?), with 10% pyrite, sd. gr. med. to crse., crvl., frosted, 10%, & occas. frag. xline Qz. clusters.

240 Dol., lt. buff, fine xline, with small Qz drk. gray from above. <3% med. sd (cave), 1 frag. grn. sh., 1 frag. Blk. Sh.

245 Dol., sim. to dol. sple 240-245' 4 frag. grn. sh. (Glwd. type)

250 Dol., br. fine xline text., 93%; lt gray dol. ss., & loose sd. 5%; <2% cht.

255 Dol., br., " " " " , Translucent, with 2% drk br. unct. sh.

260 Dol., br., sim. to sple. 250'-260' With 60% br. To gray cht; 5% grn. sh.

265 Dol., br., " " " " - " " 20% " " " cht. 3% grn sh. 1% blk sh, consid. gray sh.

270 Dol., br., " " " " - " " 50% " " " " 2% Qz sd. Auth. qz common. <3% pyrite; consid. gray sh.

Dol., br., fine xline, Transl, with gray sh, & 1 frag. blk. sh; pyrite 3%; Flint, chalced. ~~& massive Qz~~ 35% consid. clear xline. dol.

80 sh, med. gray, unct., soft, fair shaly struct., non-calc., 2% Grn. sh with dissem. Pyrite 10% br. dol. & cht.

Dol., lt. gray, fine xline. hrd, with much sh. mud, scr. frag. hrd. gray dol with inter- consid. cht. & massive qz. brown cht.

90 Dol., br. to blue, consid. cht & scr. frag. drk. sh.

Dol., drk br. gray, fine xline, soft; 20% cht. 1 frag. lim. yel. mic. sh.

00

Sheet No. 4. Name of Well. Melbourne City Well #1. Survey No. W-0905

Location ..... Date Drilled ..... Analyst Schuldt

300 — Sh, med. gray (actually silt. in text.), with frag. blk. sh., (v. unctuous), 25% br dol. q cht.; 1 frag. Lim. yel. ss, cemented.

325 — Sh, med. gray, soft, v. fine sandy, Qz., non-calc, 20% cht q massive Qz ser. lg. frag. glauc., fine x line dol.

10 — Dol., br., fine x line, soft, with 40% shale, med. to drk. gray, 20% cht.

Dol, br., fine x line, some frag. glauc., with consid. sh. mud q 1 frag. blk. sh. 1 frag. Lim. yel. ss., cemented.

20 — Dol., br. to gray, fine x line, with 40% massive qz, opaline silica q cht., Tr. blk. sh Tr. yellow ss, < 5% pyrite.; <1 5% sh. tr grn sh.

Dol., br. to gray, fine x line, with 1 frag. coal, < than 5% grn sh; < 3% Pyrite 10% cht.

3 30 — Dol., lt. gray, fine x line, mod. soft, 1 frag. massive Qz.

Dol., " ", " ", " ", 1 " " " .

40 — Dol., " ", " ", " hrd, 1 " " " , 2% cht.

Dol., " ", " ", " ", 2% wh. to transl. cht

50 — Dol., " ", " ", " ", 2 % " " " .

355 — Dol., " ", " ", hrd, glauconitic in prt.

60 — Dol., " ", " ", " ", " " .

Dol., lt. gray to drab, fine x line, hrd., tr. glauc. dol.; 2 frag. drk. gray sh; 1 frag lt grn sh.

3 70 — Dol., drab to buff, fine cubed. x line, porous; 5% cht.; Tr. Qz gr.

Dol., " " ", " ", porous in prts,

80 — Dol., " " ", " " ", " " ", few frag. Ls. wholly of fo.ss. frag.

386 — Ls, lt. buff, floury text., oolitic, 70%; Dol., drab to buff, fine x line, 30%

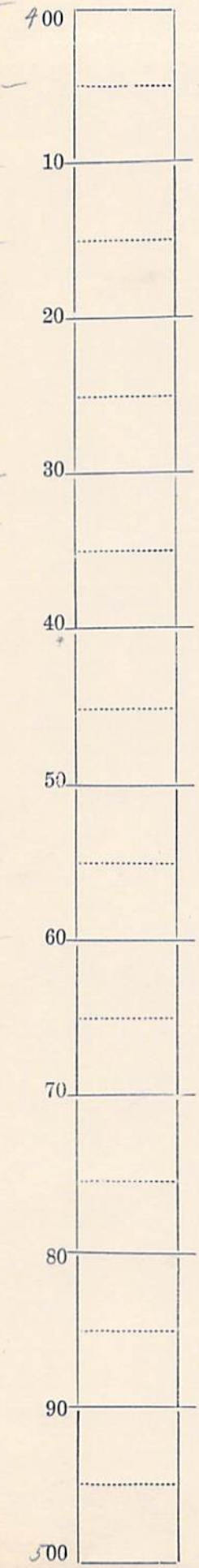
90 — Ls, lt. buff, wholly oolite with matrix fine text. to med. x line transl., fuss. 1% pyrite

Ls, lt. buff, " " " " " " " " " " .

00 —

Sheet No. 5 Name of Well. Melbourne City Well #1. Survey No. W-0908

Location ..... Date Drilled ..... Analyst Schuldt



Ls, slightly dol., lt. buff to lt. gray, fine xline, transl. ; 1% clear calcite, 1% Iron oxide
Tr. cht. 1% pyrite

90% RK

Dol, gray, fine xline, hrd, 1% pyrite, 1% cht. rare sd. gr.

77 % RK

Ls, gray, fine xline, to flaky text., with 5% clear calcite

Dol, gray & lt. buff, fine xline, sm. % clear calcite, cht. & rare sd. gr., some oolitic mat., some Ls.

Dol, sim. to spls. 415-420 ; in comp. & constituents

Dol, gray & lt. buff, fine xline sm. % clear calcite, occas Qz sd. gr., 3% calcite 1% cht

Ls, dol, lt. buff, " " " " " " 40%
Sh, drk. med. gray, unctuous, flaky cleavage, 30%
sd, med. gr., rnd., 30%

Ls, lt. buff to lt. gray, V. fine xline, drk spotted in prts., 3% Qz sd, 2% pyrite, Tr. cht

Ls, " " " " ", " " ", rare Qz gr.

Ls, " " " " ", " " ", occas. " ".

Dol, drab gray, fine xline, hrd, porous, with 50% cht., lt. gray, occas. sd. gr.

Dol, " to " , " " , " , " , " 25% lt. gray, drk. mottled cht.

Dol, calc., drab gray, fine xline, compact, hrd,

Dol, " , " " , " " , " , ", slightly porous in prts, 30% cht.

Dol, ", " " , " " , " , ", " " " " 25% Cht

Dol, ", " " , " " , " , ", " " " ", 20% Cht

Ls, lt. drab gray, fine xline, finely porous; 2% calcite ; 10% Wh. weath. cht.

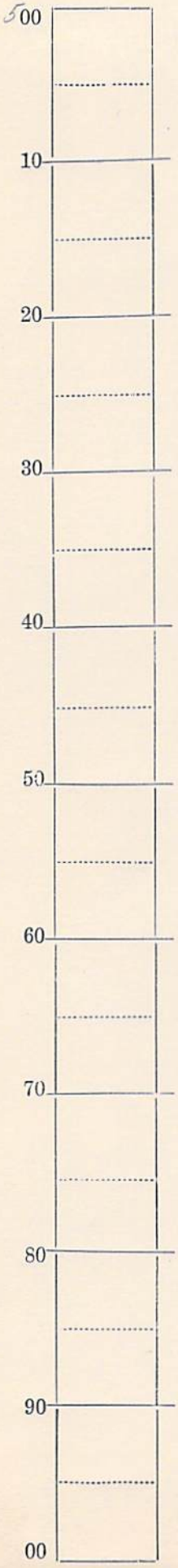
Ls, " " ", " ", " ", " " ; 10% Wh. fresh cht. oolitic & oogonia

Ls, Drab, " , " " , Translucent, hrd, 5% finely dissem. pyrite, 5% Calcite.

Dol, " , " , " ") " , " , 10% fine to crse. sd. Tr. pyrite, sm % Calcite
oolitic cht.

Sheet No. 6 Name of Well Melbourn City Well #1 Survey No. 0905

Location ..... Date Drilled ..... Analyst Schuldt



SS, med. to crse. loose sd g fine dol. or pyrite cem. ss aggregates, crse sd. poorly sorted, ang. to crvl., 2% pyrite; 30%
Dol. drab. Transl. sim. to spls above 20% Sh. H. gray, as mud, 50%
sh, lt. grn. gray, calc. hrd, poor shaly struct.

sh, " " ", " . ", " " " .

sh, " " ", " , ", " " " . 3% dissem. pyrite

sh, " " ", " , ", " " " .

sh, " " ", " , ", " " " .

sh, " " ", " , ", " " " .

sh, " " ", " , ", " " " . Pyritic

sh, " " ", " , ", " " " .

sh, " " ", " , ", " " " . Washed spls shows 8% lt. gray dol; 2% oz sd

sh, " " ", " , ", " " " . few frag. dol

sh, " " ", with streaks choc. br, slightly calc.; 5% buff dol. g lg. mat. (extran.)

sh, " " ", to lt. olive grn, slightly calc., with occas. frag. dol. g cht

sh, " " ", " " , " ", " " " . lt. gray dol. g cht

Dol., lt. gray, fine xline, porous, with 15% lt. gray, blue speckled cht. as frag. g dissem.
5% sm. to sm. pebble sized masses of xline qz, some abraded, (pass. extran.)
Sm. % sd

Dol., lt. gray, sim. to spls. 570-575, with sm. % sd. 50%
Sh, lt. gray, slightly calc.,

sh, lt. gray, slightly calc., rare frag. ls. g cht.

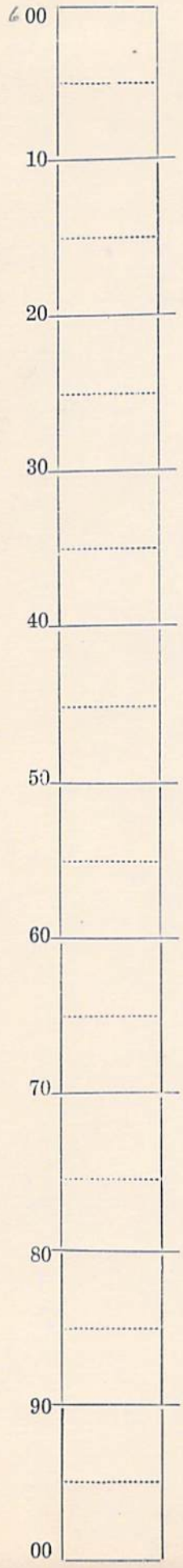
sh, " " , " " ,

sh, " " , " " , " " " " " .

sh, " " , " " , With 15% within med. gr. ang. ss cem. with Iron oxide.

Sheet No. 7 Name of Well. Melbourn City Well #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst. Schuldt



Sh, lt. gray, calc., soft, poor shaly struct. 75%
Dol, lt. gray, fine granular, porous, with lt. gray, blue mottled cht. 15%
sd, med., subang. to crvl., with V. crse ang. gr. commar. 10%; Yellow Iron Oxide frag. Common
Sh, lt. gray, calc., soft, poor shaly struct. 80%, with 15% sd., & 10% lt. gray dol., pyritic

Sh, lt. gray, soft, poor shaly struct., slightly Calc.

Sh, " ", " , " " " , " " .

Sh, " ", " , " " " , " " .

Sh, " ", " , " " " , " " .

Sh, " ", " , " " " , " " .

Dol., drab, fine granular, transl., hrd; 1 frag. cht. 1 frag. pyrite
Sh, 20%

Dol., sim. to dol. spls 635'-640'.

Dol, " " " " " - " . consid. drilling mud

Dol., drab, fine xline, Transl., hrd, sim. to dol. spls. 635-640. 5% med. to crse Qz sd, with irreg. surf., Tr. pyrite

Dol, drab to gray, sim. to spls 635-640; 15% med to crse Qz sd. crvl. to subrd, frosted, Tr. pyrite
T

Dol, " " ", " " " " - " ; 15% " " " " " ; Tr. py.; Stained Fe. Oxide frag.
5% cht

Ls, lt. buff, subxline, subtransl., hrd. 70%.
Dol, sim. to dol. spls 635-640', 30%

Ls, lt. buff, subxline, subtransl, hrd, foss., with 15% med. Qz sd.

Ls, lt. buff, " , " , " , " , " 5% " " ".

Ls, " ", " , " , " , " , " 1% " " ".
Ls, dol., blue gray, fine xline, hrd, 10%

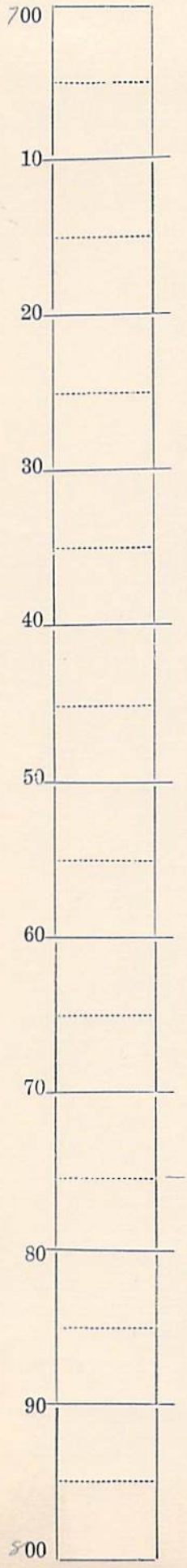
Ls, lt. buff to gray fine xline, hrd, With 15% med. Qz sd.

Sh, lt. gray to grn. gray, calc., with 15% cared mat. from above

Sh, " " " " ", " , " 15% " " " " (Dom. Qz sd)

Sheet No. 8 Name of Well. Melbourne City Well #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst Schuldt



Sh, lt. gray to grn gray, slightly calc., entirely as mud

Dol., drab to br., fine xline, transl, hrd, 70 %.
Ls, lt. buff, subxline, subtransl., hrd 30 %

Dol., sim. to dol. spls 705-710, 50% ; Ls, sim. to ls. above 20%
Sh, lt. gray, calc. 30%

Sh, lt. gray, non calc. entirely as mud ; sev. frag. of dol. from above

Sh, lt. gray to grn gray, non calc., entirely as mud.

Sh, " " " " ", " , " " " . occas. frag. dol.

Sh, " " " " ", " , " " " . " " " 1 frag. cht.

Sh, " " " " ", " , " " " .

Sh, " " " " ", " , " " " .

Sh, " " " " ", " , " " " .

Sh, " " " " ", " , " " " .

Sh, " " " " ", " , " " " . 2% Wh. Gypseum

Sh, " " " " ", " , " " " . sev. frag. rotten wood, Tr Gyp, sm % br. dol.

Sh, " " " " ", " , with sm % Gray dol., 2% Gyp.

Sh, " " " " ", " ,

Dol, br., med. xline, transl., hrd. Tr. Gyp, Tr. Py

Dol, " " " " " " .

Dol, ", " , " " , 2-5% Gyp.

Dol, ", " , " ", 2-5% " .

Dol, ", " , " ", 2-5% " .

Sheet No. 9 Name of Well Melbourne City #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst Schuldt

8 00

Dol., buff, med. to fine xline, hrd, Transl.; with 3-4% gyp.

Dol., strong br., med. to fine xline, " , " , vitreous, with 1% gyp.; Dol., lt. buff, 20%

10

Dol., " " , " " " , " , " , " , 5% gyp ; " " " , 20%

Sh, lt. grn gray, silty, non-calc. 50%, Dol., sim to 810-815' 50%

20

Sh, gray & grn gray, v fine sdy & silty,

Sh, gray, sdy, silty, structureless, 50% Tr. Gyp, Tr. py, Tr. cht. (or 515)
Sh, grn, fair shaly struct 50%,

30

Sh, gray, v fine sdy, silty, structureless, (or 515)

Sh, " , " " " , " , " , (or 515)

40

Dol, silty (?), fine gran. text, mod. soft, 50%; sls, green, shaly, fair shaly struct.

Dol, br, " " " , " Hrd. Tr cht; Tr. gyp, pyrite common

50

sls, lt. br. gray, to sh, 65% Sh, green, to sls, fair shaly struct. 35% py. occas.

Dol, br, fine gran. to fine xline text, hrd, <5% gyp, occas frax py.

60

Dol, " , " " " " " " , " , in prt. calc. 7% Gyp) py occas.

Dol, " " " " " " " " , " , " " 5% " , " " .

70

Dol, drab gray, crse xline, clastic (?) weak, with sm % grn sh

Dol, " " , " " , " " .

80

Dol, lt. buff, cr-se xline, clastic (?), weak, with 7% interstitial/ spaque, hyd. gyp.

Dol, " " , " " , " (?) " .

90

Dol, " " , " " , " (?), " , " " " " " " .

Dol, " " , " " , " (?), " , " " " " " "

00

Sheet No. 10 Name of Well. Melbourne City #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst. Schuldt

900 Dol., lt. gray, f. fine xline, hrd, flaky fract., with 35% lt. br. dol.

Dol, lt. gray & lt. br, v. fine xline, hrd, Tr. gyp.

10 Dol, " " " " ", " " " , " " " .

Dol, " br., " " " , " ; 25% Wh. lis. with crse cubod. dol. xtals.

20 Dol, " ", " gray " " ", " ; Tr. gyp

Dol, " ", " " " ", " , 3-4% Gyp.

30

Dol, " ", fine to med. xline, hrd, with sm. % interstitial gyp, Tr. pyrite,

40 Dol, " ", " " " " ", " , 2-3% " " ",

Dol. br-drab gray, fine " " " ", " , " 7% " " .

50 Dol, drab gray, " " " ", " , " 10% massive gyp

Dol, br., " " " ", " , sm % interstitial gyp

60 Dol, " , " " " ", " , 4% " " & massive gyp.

Gyp, massive, with sm. % br. dol.

70 Gyp, " , " " " " " - Gyp. wh, opaque & transl., br. & blk.

Gyp. " , " " " " " - " " " " " " "

80 Gyp. " , " " " " " - " " , " " " , " ,

Dol, br., fine xline, hrd, transl, sub vit., with 25% massive Gyp.

90 Dol, br, " " , " , " , " " , calc. in prts. 2% Gyp

Dol, ", " ", ", " , " ", " " " . Tr. Gyp.

1000

Sheet No. 11 Name of Well. Melbourne City #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst. Schuldt

1000

Dol, red br, sub xline, hrd, vit., Tr. gyp

Dol, " " , " , " , " , Tr. gyp.

10

Dol, br., extremely fine xline, hrd, compact, with sm. % interstit. gyp.

Dol, lt. br, fine to extr. " " , " , " , " " " " "

20

Dol, " ", " " " " " , " , " , Tr. gyp.

Dol, " ", " " " " " , " , " , 15% " , massive

30

Dol, lt. br., sugary, with 5% - 8% lt. gray, pore. Text. cht. ; 3% massive Gyp

Dol, " ", v. fine xline, " 10 % " " " " " ; sm % " " ; some dol. grades to ls.

40

Dol, buff, " " " , with 1-2% " " " " " ; Tr gyp.

Dol, " ", " " " , " Tr. " " " " " " ; " " .

50

Dol, drab gray, fine xline, hrd,

Dol, " " , " " " .

60

Dol, br., " to med. xline, hrd.

Dol, " , " " " " " , " , Tr. gyp.

70

Dol, " , " " " " , " , " "

Dol, " , " " " " " , " , " .

80

Dol, " , " " " " " , " , 20% Gyp

Dol, " , " " " " " , " , 10% Gyp.

90

Dol, #a, " , " " " " , " , 10% " ,

Dol, " , " , " " " " , " , 7% "
Sh, grn, silty, fair shaly struct, non-calc 15%

1100

Sheet No. 12 Name of Well Melbourne City #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst Schuldt

1100

Sh, green, silty, fair shaly struct, non-calc.

Dol, lt. br, fine to med. xline, Tr. Gyp.

10

Sh, lt. gray, non calc, entirely as mud.

Dol, soft, or sh, lt. gray, fine xline, weak, porous, sm % cyps.; dol. drills to mud

20

Dol, " , " " , " " , " " , " , " , " " ; " " " " .

Dol, " , " " , " buff, " " , " , " , Tr. " ; " " " " .

30

Dol, " , " " , " " , " " , " , " , ") " " " " .

Dol, " , " " , " " , " " , " , " , " ; " " " " .

40

Dol, " , " " , " " , " " , " , " , " , 10% Gyp

Gypsum, white, massive, 100 %

50

Gyp, " , " , 90%, 10% dol. flour.

Gyp, " , " , 90%, 10% soft dol, sm. % tr l. cht.

60

Gyp, " , " , 90 , 10% " " , 10% Gray to blk transl. cht.

sh, red, dense, & sh, green gray, unct, 80 %; 8% med. sd, 7% cht, 4% dol, 1% Gyp.

70

Sh, red, dense, with 15% sd. 1-2% Gyp (caved)

Cht, wh. opaque To buff transl, massive, bedded, with 5% red sh, & hrd gm silty sh.
3% Com. med. ss

80

cht, " " " " " , " , " , 15% hrdred sdy sh, 3% grn sh

cht, " " " wh " , " " , 2% Grn & rd sdy sh

90

Cht, " " " " " , " " , 10 % " " " " "

cht, " " " " " , " " , Tr. " " " " "

00

Sheet No. 13 Name of Well Melbourne City #1 Survey No. W-6908

Location .... Date Drilled .... Analyst Schuldt

Depth	Description
1200	cht, wh, opaque & Transl, massive bedded, foss., with 5% rd & grn sdy-sh
	Cht, ", " " ", " ", ", " " " " " " ".
10	Cht, ", " " ", " "), ", " 8% " " " " ".
	Cht, ", " " ", " ", ", " 12% " " " " ", 3% Dol, br
20	cht, ", " " ", " ", ", " 20% " " " 3% " "
	cht, ", " " ", " ", ", " 20% " " " " ", 2% br.dol, 1% Gyp; Pyritic
30	Cht, ", " " ", " ", ", " 20% " " " " " 1% Gyp Pyritic Dol, drab gray, fine to subxline, v.hrd, 30%
	cht & dol, sim to sple 1230-1235', dol 60%, Cht 10%, 30% " " " " ", 3% Gyp Pyritic
40	cht & dol, " " " " -", " 25%, Cht 40%, 25% " " " " " 5% Gyp
	cht & dol, " " " " ", " 55%, Cht 7%; " 30% " " " " 5% Gyp, Pyritic
50	Dol, " " " " ", " 50%, " 7; " 25% " " " ", 10% ", Pyritic
	Dol, lt.buff, fine xline to subxline, transl, v.hrd, 5% green & red sh & 1% gyp
60	Dol, " ", " " " ", " ", " ", 2% grn sh, 5% cht, 1% gyp
	Dol, lt.buff, fine xline " " ", " ", ", sdy, 5% grn mud hrd sh, 5% Gyp, 5% blk or banded cht
70	Dol lt. drab to grn, finexline, transl, hrd, with 50% wh, weath cht
	Dol, " " " ", " ", ", ", " 60% " " ".
80	Dol, " " " ", " ", ", ", " 60% " " ". 10% grn sh – occas Glauc gr. in sh
	Dol, " " " ", " ", ", ", " 70% " " " 3% " ".
90	Dol, " " ", " ", ", ", " 30%, 10% med grn wellrded, frosted Qz sd, 10% grn glauc sh.
	Dol, " " ", " ", ", ", " 40%, 10% " " " " ", " " ", occas Glauc. gr
1300	

Sheet No. 14 Name of Well Melbourne City #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst Schuldt

1300

Dol, grn, finexline, g buff, subxline, hrd, transl, with 5% argr, with 30% red g green silty sh, sm % gyp.

Sh, green, g choc. br. interbanded, micaceous,

10

Sh, " " " " " " , " , with 20% br dol, <5% cht, sm % sd

No Sple.

20

No Sple.

Sh, brn g grey, soft, as mud, sm % cht, dol, g qz sd

30

Sh, " - br., " ghrd, dim. as mud, sm % cht, dol, g qz sd

Sh, " " ", " " ", " " ", " " " " " ".

40

CM

50

60

70

80

90

00

December 21, 1938

Mr. Howard R. Green
208-210 Beaver Building
Cedar Rapids, Iowa

Dear Mr. Green:

I am sorry that this report on the Melbourne town well has been delayed, but an emergency arose in our office which had to be met. The enclosed generalized, descriptive log shows our interpretation of the well cuttings from the base of the Pennsylvanian to a depth of 335 feet. I feel confident that the material below 227 feet belongs in the Hampton formation in the Kinderhook series since the dolomites are entirely characteristic. However, the shales interbedded with the dolomites are not characteristic and were unexpected at this locality. Although they are relatively thin, they may be troublesome and I cannot be sure from a study of the cuttings if the shale should be cased off or not. Probably a better judgment on this point can be made after drilling has been continued. I have reported to Mr. McCutcheon on this and he asked me to tell you that he will await word from you regarding the casing.

The cuttings to a depth of 335 feet show that the strata are almost 25 feet high and unless there is an abnormal thickness of the lower members of the Hampton the Maple Mill formation will be encountered before a depth of 500 feet is reached. However, I think it would be well to drill a short distance into the Maple Mill so that if the English River siltstone is present you will have the advantage of any water which it may contain.

I will be very much interested in the results of this well and trust that if I can be of service you will not hesitate to call on me.

Very truly yours,

H. G. Hershey

HGH:LM
Enc.

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

Name of Well: Melbourne City Well Survey No. W-0908

Drilled by: Marshal County, Logan Twp. Date _____,193__

Total Depth: _____ft; Curb Elevation: 1050 ft; Static Level: _____ft.

Casing Data: _____

_____

Pump and Screen Data: _____

_____

Pumping Test: ____Hours____Min; Gal. Per Min. _____; Drawdown____ft. in____ min.

Description of Formations

NW¼, SW¼, SW¼, NE¼ Sec. 6, T82N, R19W
Contractor McCutcheon Well Co.

No.	Rock Unit	Thick.	From (Feet)	To
	PENNSYLVANIAN SYSTEM Des Moines Series			
1.	Shale, light to dark gray, non calcareous, with thin coal band of 207' and less than 1% pyrite	5'	205'	210'
	MISSISSIPPIAN SYSTEM Meremec Series St. Louis Formation			
2.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite, and with occasional bands of hard gray limestone	5'	210'	215'
	Shale, white (From driller's log)	3'	215'	218'
3.	Limestone, very light gray, fine crystalline, soft, with 5% very light green, soft, calcareous shale, (Driller's log shows 3' white shale to 218')	2'	218'	220'
4.	Limestone, light buff to light gray, fine crystalline, soft	6'	220'	226'
	Kinderhook Series Hampton Formation			
5.	Dolomite, light drab, fine crystalline, with trace of chert	9'	226'	235'
6.	Dolomite, light buff to brown, with thin bands of sandstone; sand medium to coarse, curvilinear, frosted, 10%	5'	235'	240'
7.	Dolomite, light buff, fine crystalline, with small percentage green shale	10'	240'	250'

Notes:

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

Name of Well: Melbourne City Well Survey No. W- 0908

Drilled by: _____ Date _____, 193__

Total Depth: _____ ft; Curb Elevation; 1050' ft; Static Level: _____ ft.

Casing Data: _____

_____

Pump and Screen Data: _____

_____

Pumping Test: ____ Hours ____ Min; Gal. Per Min. _____; Drawdown ____ ft. in _____ min.

Description of Formations

No.	Rock Unit	Thick.	From (Feet)	To
8.	Dolomite, brown, very fine crystalline texture, with 5% light gray dolomitic sandstone; trace of chert	5'	250'	255'
9.	Dolomite, brown, very fine crystalline, translucent	5'	255'	260'
10.	Dolomite, brown, very fine crystalline, with 60% brown to gray chert. Authigenic quartz crystals common between 270' and 275' (Driller's log records 4 streaks green shale at 270')	24'	260'	284'
11.	Shale, medium gray, unctuous, soft, non-calcareous, (Driller's log records 3' gray shale 284 - 287')	3'	284'	287'
12.	Dolomite, light gray, fine crystalline, hard, with much shale mud	3'	287'	290'
13.	Dolomite, brown to blue, with much chert, fine crystalline, soft	10'	290'	300'
14.	Shale, medium gray (actually a siltstone), with fragments of black shale, and bands of brown dolomite (Driller's log records gray shale with hard bands from 293' to 307')	5'	300'	305'
15.	Shale, medium gray and similar to above, but grading from siltstone to very fine sandstone. With band of highly glauconitic, very fine crystalline dolomite. Shale contains considerable massive quartz and chert	2'	305'	307'
16.	Dolomite, brown, fine crystalline, soft, with 40% gray shale. Some glauconiferous dolomite	13'	307'	320'

Notes:

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

Name of Well: Melbourne City Well Survey No. W-0908

Drilled by: _____ Date _____, 193__

Total Depth: _____ ft; Curb Elevation: 1050' ft; Static Level: _____ ft.

Casing Data: _____

Pump and Screen Data: _____

Pumping Test: ____ Hours ____ Min; Gal. Per Min. _____; Drawdown ____ ft. in _____ min.

Description of Formations

No.	Rock Unit	Thick.	From (Feet)	To
17.	Dolomite, brown to gray, fine crystalline, with much massive quartz, opaline silica, and chert. Trace of yellow sandstone, pyritic	10'	320'	330'
18.	Dolomite, light gray, fine crystalline, moderately soft	5'	330'	335'

Notes:

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

Name of Well: Melbourne City Well Survey No. W- 0908

Drilled by: McCutcheon Well Co. Date Dec., 1938-May, ,193 9

Total Depth: 1340 ft; Curb Elevation: 1050 ft; Static Level: ____ ft.

Casing Data: ____

Pump and Screen Data: ____

Pumping Test: ____ Hours ____ Min; Gal. Per Min. ____; Drawdown ____ ft. in ____ min.

Description of Formations

No.	Rock Unit	Thick.	From (Feet)	To
	PLEISTOCENE SYSTEM			
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65	0	65
2.	Drift, gray, coarse sandy, calcareous, micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reworked Pennsylvanian shale)	10	160	170
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10	170	180
	PENNSYLVANIAN SYSTEM			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite	30	180	210
	MISSISSIPPIAN SYSTEM			
	Meremec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone	5	210	215
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11	215	226
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235'-240' and 250'-255'	34	226	260
	Osage Series			
	Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275'. Driller's log shows 4 streaks green shale at 270'	24	260	284

Notes:

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
10.	Shale, medium gray, unctuous, soft, non-calcareous	3	284	287
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13	287	300
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with hard bands from 293'-307')	7	300	307
13.	Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica, and chert in lower 10'	23	307	330
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
	Kinderhook Series			
	Hampton Formation			
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16	370	386
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent	19	386	405
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5	405	410
18.	Limestone, gray, fine crystalline to flaky textured	5	410	415
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15	415	430
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	3	430	433
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17	433	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30	450	480
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in upper part)	20	480	500
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2	500	502

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	Maple Mill Formation			
25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68	502	570
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	7	570	577
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured cherty dolomite at approximately 600'	56	577	633
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline, transluscent; 10% coarse irregular quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower 6 feet	24	666	690
30.	Shale, light greenish gray, calcareous	15	690	705
31.	Dolomite, drab to brown, fine crystalline, transluscent with thin band limestone at top	7	705	712
32.	Shale, light gray, calcareous, with occasional thin bands of brown dolomite	63	712	775
	Shell Rock Formation			
33.	Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 800'-805'. Traces of gypsum	40	775	815
34.	Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure	27	815	842
35.	Dolomite, brown, fine granular texture, hard, trace gypsum	8	842	850
36.	Shale or siltstone, light brownish gray, fair shaly structure	5	850	855
	Cedar Valley and Wapsipinicon Formations			
37.	Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum	15	855	870

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
38.	Dolomite, drab gray, coarse crystalline, clastic(?) weak	10	870	880
39.	Dolomite, light buff, coarse crystalline, clastic(?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white limestone with euhedral dolomite crystals between 915'-920'. Traces gypsum	30	900	930
41.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium crystalline, hard, with small percentage interstitial gypsum	30	935	965
43.	Gypsum, white, massive bedded, in part brown or black	20	965	985
44.	Dolomite, brown to red brown, fine to extremely fine crystalline, hard, vitreous, with small percentages interstitial gypsum in lower part	45	985	1030
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain textured chert and traces gypsum	20	1030	1050
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20% gypsum in lower 30'	49	1050	1099
47.	Shale, light green, silty, fair shaly structure	6	1099	1105
48.	Dolomite, light brown, fine to medium crystalline	5	1105	1110
49.	Shale, light gray, non-calcareous, entirely as mud	5	1110	1115
50.	Dolomite, soft, light gray, fine crystalline, weak, porous, with small percentages gypsum. Dolomite drills to mud	30	1115	1145
51.	Gypsum, white, massive bedded	20	1145	1165
52.	Shale, red, dense, and shale green gray, slightly unctuous, sandy (10% medium quartz sand)	10	1165	1175

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, translucent, massive bedded, with small percentage red and green shale cave, increase in quantity in lower 15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystalline, very hard, with 10-20% chert, part of which may be cave, and 25% red and green sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystalline, transluscent, vitreous, sandy in lower 5'	20	1250	1270
56.	Dolomite, light drab to green, fine crystalline, transluscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	35	1270	1305
	ORDOVICIAN SYSTEM			
	Maquoketa Formation			
57.	Shale, green and chocolate brown interbanded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	Shale, green, gray, and brown, soft, and hard, fair shaly structure	15	1325	1340

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

Name of Well: Melbourne City Well Survey No. W-0908

Drilled by: McCutcheon Well Co. Date Dec., 1938-May, ,1939

Total Depth: 1340 ft; Curb Elevation: 1050 ft; Static Level: ____ ft.

Casing Data: ____

Pump and Screen Data: ____

Pumping Test: ____ Hours ____ Min; Gal. Per Min. ____; Drawdown ____ ft. in ____ min.

Description of Formations

No.	Rock Unit	Thick.	From (Feet)	To
	PLEISTOCENE SYSTEM			
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65	0	65
2.	Drift, gray, course sandy, calcareous, micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reworked Pennsylvanian shale)	10	160	170
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10	170	180
	PENNSYLVANIAN SYSTEM			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite	30	180	210
	MISSISSIPPIAN SYSTEM			
	Meremec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone	5	210	215
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11	215	226
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235'-240' and 250'-255'	34	226	260
	Osage Series			
	Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275'. Driller's log shows 4 streaks green shale at 270'	24	260	284

Notes:

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
10.	Shale, medium gray, unctuous, soft, non-calcareous	3	284	287
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13	287	300
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with hard bands from 293'-307')	7	300	307
13.	Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica, and chert in lower 10'	23	307	330
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
	Kinderhook Series			
	Hampton Formation			
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16	370	386
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent	19	386	405
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5	405	410
18.	Limestone, gray, fine crystalline to flaky textured	5	410	415
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15	415	430
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	3	430	433
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17	433	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30	450	480
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in upper part)	20	480	500
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2	500	502

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	Maple Mill Formation			
25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68	502	570
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	7	570	577
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured cherty dolomite at approximately 600'	56	577	633
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline, transluscent; 10% coarse irregular quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower 6 feet	24	666	690
30.	Shale, light greenish gray, calcareous	15	690	705
31.	Dolomite, drab to brown, fine crystalline, transluscent with thin band limestone at top	7	705	712
32.	Shale, light gray, calcareous, with occasional thin bands of brown dolomite	63	712	775
	Shell Rock Formation			
33.	Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 800'-805'. Traces of gypsum	40	775	815
34.	Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure	27	815	842
35.	Dolomite, brown, fine granular texture, hard, trace gypsum	8	842	850
36.	Shale or siltstone, light brownish gray, fair shaly structure	5	850	855
	Cedar Valley and Wapsipinicon Formations			
37.	Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum	15	855	870

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
38.	Dolomite, drab gray, coarse crystalline, clastic(?) weak	10	870	880
39.	Dolomite, light buff, coarse crystalline, clastic(?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white limestone with euhedral dolomite crystals between 915'-920'. Traces gypsum	30	900	930
41.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium crystalline, hard, with small percentage interstitial gypsum	30	935	965
43.	Gypsum, white, massive bedded, in part brown or black	20	965	985
44.	Dolomite, brown to red brown, fine to extremely fine crystalline, hard, vitreous, with small percentages interstitial gypsum in lower part	45	985	1030
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain textured chert and traces gypsum	20	1030	1050
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20% gypsum in lower 30'	49	1050	1099
47.	Shale, light green, silty, fair shaly structure	6	1099	1105
48.	Dolomite, light brown, fine to medium crystalline	5	1105	1110
49.	Shale, light gray, non-calcareous, entirely as mud	5	1110	1115
50.	Dolomite, soft, light gray, fine crystalline, weak, porous, with small percentages gypsum. Dolomite drills to mud	30	1115	1145
51.	Gypsum, white, massive bedded	20	1145	1165
52.	Shale, red, dense, and shale green gray, slightly unctuous, sandy (10% medium quartz sand)	10	1165	1175

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, translucent, massive bedded, with small percentage red and green shale cave, increase in quantity in lower 15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystalline, very hard, with 10-20% chert, part of which may be cave, and 25% red and green sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystalline, transluscent, vitreous, sandy in lower 5'	20	1250	1270
56.	Dolomite, light drab to green, fine crystalline, transluscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	35	1270	1305
	ORDOVICIAN SYSTEM			
	Maquoketa Formation			
57.	Shale, green and chocolate brown interbanded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	Shale, green, gray, and brown, soft, and hard, fair shaly structure	15	1325	1340

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

PRELIMINARY

Name of Well: Melbourne City Well Survey No. W-6308

Drilled by: McCutcheon Well Co. Date _____,193__

Total Depth: _____ft; Curb Elevation: 1060 ft; Static Level: _____ft.

Casing Data: _____

Pump and Screen Data: _____

Pumping Test: ____Hours ____Min; Gal. Per Min. _____; Drawdown ____ft. in _____ min.

Description of Formations

No.	Rock Unit	Thick.	From (Feet)	To
	PLEISTOCENE SYSTEM			
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65'	0'	65'
2.	Drift, gray, coarse sandy, calcareous, micaceous	95'	65'	160'
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reported Pennsylvanian shale)	10'	160'	170'
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10'	170'	180'
	PENNSYLVANIAN SYSTEM			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous with thin coal bank at 207'; trace pyrite	30'	180'	210'
	MISSISSIPPIAN SYSTEM			
	Meramec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone.	5'	210'	215'

Notes:

MELBOURNE CITY WELL

Description of Formations.

No.	Rock Unit	Thick.	From	To
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11'	215'	226'
	Kinderhook Series Hampton Formation			
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235'-240' and 250'-255'	34'	226'	260'
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275' Drillers log shows 4 streaks green shale at 270'	24'	260'	284'
10.	Shale, medium gray, unctuous, soft, non-calcareous	3'	284'	287'
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13'	287'	300'
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (drillers log shows gray shale with hard bands from 293-307'	7'	300'	307'
13.	Dolomite, brown fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica, and chert in lower 10'	23'	307'	330'
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40'	330'	370'
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16'	370'	386'
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent	19'	386'	405'

MELBOURNE CITY WELL

Description of Formations

No.	Rock Unit	Thick.	From	To
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5'	405'	410'
18.	Limestone, gray, fine crystalline to flaky textured	5'	410'	415'
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15'	415'	430'
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	3'	430'	433'
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17'	433'	450'
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30'	450'	480'
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in upper part).	20'	480'	500'
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2'	500'	502'
	Maple Mill Formation			
25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68'	502'	570'
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	7'	570'	577'

MELBOURNE CITY WELL

Description of Formations

No.	Rock Unit	Thick.	From	To
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured chorty dolomite at approximately 600'	56'	577'	633'
28.	Dolomite, drab, fine crystalline, translucent; 10% coarse irregular quartz masses in lower half	33'	633'	666'
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower 6 feet	24'	666'	690'
30.	Shale, light greenish gray, calcareous	15'	690'	705'
31.	Dolomite, drab to brown, fine crystalline, transluscent, with thin band limestone at top 1-2 ft.	7'	705'	712'
32.	Shale, light gray, calcareous, with occasional thin bands of brown dolomite	53'	712'	765'

Our log of well sent to:
(1) H. Becker, Mayor, Melbourne, Ia
(2) H. R. Green, 208-210 Bever Bldg. Cedar Rapids, Ia
(3) H. S. McCutcheon, McCutcheon Well Co., Des Moines Ia.
March 2, 1939 - To a depth of 765'

March 2, 1939

Mr. F. Becker, Mayor
Melbourne, Iowa

Dear Sir:

In response to your request we are enclosing a copy of our generalized log on the Melbourne well based on detailed descriptions of the well cuttings. The log is complete only to a depth of 765 feet. We have not received samples below that depth.

We have been informed that the well was at 870 feet on February 28 and from our records this should be well into the Cedar Valley formation of Devonian age. Records of other wells indicate that you should not have any appreciable amount of shale in future drilling until the Maquoketa formation is reached.

If you have any questions regarding the log, please do not hesitate to call on me.

Very truly yours,

HGH:LM

H. G. Hershey

Feb. 16, 1939.

Mr.H.G.Hershey,

Iowa City,

Iowa.

Dear Sir:-

We would appreciate it if you would send us the result of your findings after a study of the cuttings from the Melbourne well.

The drill hole is now at 815' and went from shale to a hard rock at 776'.

A bit softer now the rock of a more brownish shade.

Yours Sincerely,

F. Becker

Mayor, Melbourne, Iowa.

March 2, 1939

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

Thank you for your card of February 28 stating that the Melbourne well had reached a depth of 870 feet on that date and that there was no noticeable change in water level. I presume from this that the water level is still 130 feet below the surface.

We have completed our study of the well cutting samples to a depth of 765 feet, and at the request of Mr. F. Becker, Mayor of Melbourne, we are sending him a copy of our preliminary report.

Very truly yours,

HGH:LM

H. G. Hershey

March 2, 1939

Mr. F. S. McCutcheon
McCutcheon Well Company
Des Moines, Iowa

Dear Mr. McCutcheon:

Enclosed is our generalized log based on a detailed study of samples from the Melbourne well to a depth of 765 feet. You will notice a few slight changes from our earlier log. We have not received samples from below 765 feet, which I believe to be very near the base of the Sheffield formation.

We have been informed that the well was 870 feet deep on February 28. According to our best information this should be well into the Cedar Valley formation of the Devonian system, although we cannot be sure of this until the deeper samples are received and studied.

I have just completed a careful check of the deeper wells nearest Melbourne. The only ones that were useful were those at Nevada, Grinnell, Ames, and Newton. Unfortunately, there was no good evidence for an accurate forecast of the depth to the top of the Maquoketa. The Maquoketa changes rapidly in thickness in the vicinity of Melbourne and this change affects the top of the formation. I could give you an estimated figure but it would not be reliable.

Records of other wells indicate clearly that you should not have any appreciable amount of shale from 870 feet to the top of the Maquoketa.

Please do not hesitate to let me hear from you if I can be of any assistance. I can now promise more prompt replies to your requests.

Very truly yours,

HGH:LM H. G. Hershey

March 2, 1939

Mr. Howard R. Green
208-210 Bever Building
Cedar Rapids, Iowa

Dear Mr. Green:

Enclosed is a generalized log based on a detailed study of samples from the Melbourne well to a depth of 765 feet. You will notice a few changes in comparing this log with an earlier one submitted to you. We have not received samples below 765 feet, which I believe to be very near the base of the Sheffield formation.

We have been informed that the well was 870 feet deep on February 28 and, according to our best information, this should be well into the Cedar Valley formation of Devonian age although we cannot be sure of this until the samples are received and studied.

I hope that the log will be useful to you and trust that if the Geological Survey can assist further on the Melbourne project you will not hesitate to call on us.

Very truly yours,

HGH:LM

H. G. Hershey

1300 ft B
earth drill.
Melbourne.

HOWARD R. GREEN COMPANY
Consulting Engineers
DESIGN, SUPERVISION AND MANAGEMENT OF
MUNICIPAL IMPROVEMENTS
PAVEMENTS, SEWERAGE, WATER SUPPLY
INVESTIGATIONS AND REPORTS
208-209-210 BEVER BUILDING
CEDAR RAPIDS, IOWA

December 24, 1938
(Dict.12/23/38)

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

Dear Dr. Hershey:

Thank you very much for your letter of December 21 relative to the Melbourne situation. We will be glad to discuss this matter with you further as the drilling progresses.

Yours very truly,

HOWARD R. GREEN COMPANY

HRG:V

By H R Green

Wintercut:

Would like to discuss formations at an earth dam site when you return from Baltimore. Will you please call me (C.R. 2-7511)

Operator 109

Maple

507
117½ sw
11 gpm
117-200
cleared 1 hr
Then 1 hr
90 of 15.

25 gpm
for 20 min.

Dr. M. A. Stainbrook's Notes

W-0908
Melbourne (Marshall)
Melbourne City #1

490-500 Chapin

500-505 English river

505-570 Maple Mill

570-580 dolomitic, cherty Maple Mill. Doesn't look like "Aplington"

585-635 shale Maple Mill

635-665 dolomite Owen member of Lime Creek

665-690 limestone, fossiliferous and shale Cerro Gordo

690-775 shale, Juniper Hill

775-815 dolomite, Cedar Valley

815-840 shale, dolomitic Cedar Valley compare with shale in the middle of the Cedar Valley in Floyd County

845-900 dolomite Cedar Valley

900-925 dolomite, fine- grained, Davenport

925-940 Spring Grove

G4

Sheet No. 1 Name of Well Melbourne City Well # 1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst Harris

500

siltstone pyrite cemented 15 Sh gr lam 25
ss v.fn + crse. some highly pol 90 siderite tr
Dol. drk. fn to med 15 Cht lt. gr conch. ~5% some pale bl. chal
Sh lt. grn, lam, v. sltly calc

10

Sh lt. grn, poorly lam, v. sltly calc, py rc hard

ditto

20

py

ditto dk brn spores (?)

ditto

30

"

"

40

" much dolo cave?

Sh sltly grnish gr. sltly calc

50

sh ditto + blk spots
sh, brn, lam wh spots, micac, calc tr

sh ditto

60

py

ditto

ditto much dolo cave

70

Dolo, lt. gr. med, por, cht y 40 grn sh 5%
cht wh + lt. gr. with blk spots 40
py Qtz sd crse 5%
Dol, gr., med, por glauc sd. med to crse ~5%
Cht. wh mot gr + dk gr. 20% vesic sh as above 5%

80

Sh sltly grnish gr. sltly calc, soft. sltly silty

Sh sltly grnish gr. v. sltly calc, soft unct. lam

90

ditto

sh lt-med gr ditto
ss 15 dk brn fn iron ox cemented A

600

Sheet No. 2 Name of Well Melbourne City Well #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst Harris

600

sh, lt-med gr, massive, dolo
Dolo & cht as in 570-575 (cave)
sd fn to crse frosted & pol 15%

sh ditto

sd as above 10% cave

10

sh, lt. gr., dolo, slty silty unct.

ditto

20

30

Dolo, drb brn, med, dnse to sacch, slty
cht, wh, conch op - 5%

40

Dolo ditto brn spks, slty

sh med gr, lam 5%

Dolo ditto calc brach frag, slty
sd.

tr sh med gr. py

50

Dolo, drb, med subsacch, glauc, slty, calc

cht lt. gr. sd 10% py

Dolo ditto fos

sd fn to crse, irreg surf, A to c 15

60

Dolo ditto tr glauc

cht tr lt gr to dk gr banded, some lt gr; sd 30 cave
Dolo ditto pyrc 20
Ls, crm bff, v. fn xtln fos
limonite dk yel to brn massive - 5 sd - 5%

70

Ls, 40/1 brn, with med brn dolo rhombs slabby

Ls, as above 60 py

Ls, crm, med & earthy brach

80

Ls ditto
Dolo, brn to gr. med xtln, 20

sd fn a to c 10%

Dolo ditto
Ls ditto 20
sd 15% fn to med (glac)

90

Sh with med dolo rhombs grnish gr. massive, v. dolo

Dolo 70% ↔ sh med xtln

700

Sheet No. 3 Name of Well Melbourne City Well #1 Survey No. W-0908

Location ..... Date Drilled ..... Analyst S.E.H.

700

Sh lt-med gr v dolo, dull, massive

Dolo, brn to gr, med. arg.
ls, crm to lt. bff, fn. 10%

10

Dolo ditto
ls 10%
Sh lt.-med gr dolo 35 sd fn 5

Sh, lt-med gr. dolo

dolo as above 15%

20

sh ditto sltly silty

sh ditto lt grn

30

sh v. dolo ditto

ditto

40

50

60

see Schuldt

70

sh, lt med gr v sltly dolo nonlam

P.Y.

Dolo, v lt. bff, med, hard.

tr wh gyp +

80

Dolo ditto

tr gyp apparently veinlets some selenite

Dd v lt. bff, lt brn + pale gr. crse med

tr gyp + selenite

90

Dolo ditto

-5% gyp

Dolo ditto

-5% gyp. wh cal

800

Sheet No. 4 Name of Well Melbourne City Well Survey No. W.-0998.

Location ..... Date Drilled ..... Analyst S.E.H.

800

Dolo, lt crm bff, crse - med, hard, transl

-5% gyp.

Dolo, brn, dk brn arg spks, transl.

Dolo as above 10% tr gyp.

10

Dolo, brn med transl

Dolo bff 10%

tr gyp sh gr -5%

Sh med sltly grnish gr., lam, ⟷ Dolo, gr arg. med

Dolo from above

20

Dolo v arg, med gr ⟷ sh ditto

sh lt med sltly grnish gr. dolo, massive

30

sh ditto but irreg lam

Sh lt med gr. v dolo

40

sh ditto

Dolo lt. brn, med, silty 30% py

Dolo lt. brn, med, subsacch

sh 5%

50 tr gyp

sh lt-med grn, lam, dolo silty

dolo as above 20% py

Dolo med brn med por

sh gr. 20%

60

Dolo ditto

lt. grn sh 10%

gyp -5%

Dolo ditto

70 gyp wh 5%

Dolo, lt. bff, crse, por

sh, med grn, dolo -5%

Dolo, crm, crse,

80 py

Dolo, pale crm crse.

wh gyp

Dolo ditto iron stained

90

Dolo ditto iron stained

Dolo lt. bff crse 15

Dolo, crm, crse, v. slow eff. py

wh gyp

900

Drillers log Melbourn

From	To	
711	776	Blue shale (Mesh mill)
	807	Hard gray rock
	818	Brown rock (dol
	847	Gray shale
	861	Gray shale with dol. Bands
	877	Brown dol. Top 8' full of Gypsum bands
	916	Light Cherty, lime,
	936	Gray dol
	939	Soft Brown dol
	960	Gray dol. with Gypsum bands
	967	Brown dol
	970	Gypsum
	991	Chert, Gyp, & dol.
	1019	Brown. dol
	1024	Dirty brown lime (loaded with oil)
	1033	Br. hrd dol
	1070	Gray dol
	1095	Brown soft dol
	1165	Shale gray.

Melbourne

Feb. 28, 1939.

Not much progress made last week.

Party called used up in repairing equipment.

Depth today was about 870' drilling in brown limestone.

No noticeable change in water level.

H Clark

Melbourne

Feb. 18

The first 8 foot drop
came over night
Stands hard about 130.
Jet. was 140 Monday
tuesday 137 (morning)
[illegible] hard about 130
Drop was gradual
Drop came very soon
after hitting sand
rock.
No crevices to speak
of — occasionally soft spot
Hard of [illegible] band
hard
crack about 1 foot
then band of soft
rock.
Depth of well this
morning 815 feet.
Will write further
tomorrow
Friday A.M.

Date Received 12/15/38

Name of Well City Well Well No. W-0908

Town Melbourn, Ia. County Marshall

Location NW, SW, SW, NE Sec. 6 T, 82 N, R. 19 W 5 Logan Twp.

Contractor and Address McCutcheon Well Co., Des Moines

Driller Orey Hicks

Date Drilled _____ Curb Elevation 1050 (Temp) (±1.5')

No. of Samples 59 No. of Duplicates 59 Condition Good

Log: Yes ~~No~~ Condition of Log: (See Schuldt)

Sample Range: 0-335

Additional Sheets in Dr Hershey's Office

Remarks: _____

Boxed by: Unkleshay Dec 15 and completed by Yoho Jan. 3, 1939.

HOWARD R. GREEN COMPANY
Consulting Engineers
DESIGN, SUPERVISION AND MANAGEMENT OF
MUNICIPAL IMPROVEMENTS
PAVEMENTS, SEWERAGE, WATER SUPPLY
INVESTIGATIONS AND REPORTS
208-209-210 BEVER BUILDING
CEDAR RAPIDS, IOWA

June 2, 1938
(Dict.6/1/38)

Dr. Hersey
Iowa Geological Survey
103 Geology Building
Iowa City, Iowa

Dear Dr. Hersey:

We have been engaged by the Town of Melbourne, Iowa, to design a complete water works system. We understand that you have made some investigations on behalf of the State Department in the field of deep well development in that locality. If you have any information which you can release to us at this time relative to underground formations, water producing possibilities and water analyses, we will indeed be grateful to receive them.

Yours very truly,

HOWARD R. GREEN COMPANY

HRG:V

By H R Green
44

HOWARD R. GREEN COMPANY
Consulting Engineers
DESIGN, SUPERVISION AND MANAGEMENT OF
MUNICIPAL IMPROVEMENTS
PAVEMENTS, SEWERAGE, WATER SUPPLY
INVESTIGATIONS AND REPORTS
208-209-210 BEVER BUILDING
CEDAR RAPIDS, IOWA

June 8, 1938

SUBJECT:
Melbourne,
Iowa

Dr. H. G. Hershey
Iowa Geological Survey
103 Geology Building
Iowa City, Iowa

Dear Dr. Hershey:

Thank you very much for your informative letter of June 6. Our instructions in this case are to prepare an application to PWA. If this application is successful and a bond election is also successful in the town, the job will go forward. Obviously the delay before actual construction will be considerable. Therefore, agreeable to the last paragraph of your letter, we would appreciate any further observations you have time to make and comment upon.

The school house well certainly produces a very hard water, and even if zeolite softening were resorted to, it is probable that a brackish water would be produced. Therefore, I am inclined to attempt to develop a supply at the shallower depths which may be productive enough to satisfy the town's demand during the early years of the system's existence. I have not taken the time yet to get into this case and do not know whether we will be warranted in going to the deeper aquifers or not. Obviously we will appreciate any comment you care to make.

Yours very truly,

HOWARD R. GREEN COMPANY

HRG:V

By H R Green
HH

February 16, 1939

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

Thank you very much for your card of February 15 regarding drilling and water levels of the Melbourne city well.

The change in water level is very important and I should like to have some additional information on it if possible. What was the water level before the 8-foot drop which you mention, that is above a depth of about 770 feet? Did the 8-foot drop come suddenly or was it a slow change? Did the change come immediately after entering the solid rock, or after the rock had been penetrated some distance? Did the change come after a crevice had been penetrated?

I will appreciate it very much if you will answer these questions. We are studying the samples and hope to have the preliminary report ready very soon

I am enclosing some additional cards to facilitate in making reports on the well.

Very truly yours,

HGH:LM
Encs.

H. G. Hershey

my last card

Wednesday

Noon today
810 feet down
Last 40 feet has
been hard
rock. Driller
says Limestone

Tuesday morn.
coating had
dropped 8 feet.
No noticeable
difference today
in water level

Marked

9-482
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300

MELBOURNE FEB 15 GPO 6 PM 1939 IOWA

1

T. W. ROBINSON
Iowa Geological Survey Bldg.
IOWA CITY, IOWA

Dec. 12, 1938

Monday 1/7/1938
Well is 290 feet
Naow today.
Going thru rock
and occasionly
strike little vein
of shale.
Well had 130 foot
of water this
morning.
Supply comes
on Sled.

H K Carlett
Mechanic

Feb 1, 1939

Feet 678' this
evening.
Have been in a
dark very hard
rock.
This P.M. have hit
light gray rock
and much softer
We enjoyed like
to hear from
you
H K Corbett
Mechanic

Wednesday eve

U.W.

February 10, 1939

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

Please accept my apology for not having communicated with you before this time.

I talked recently with Mr. McCutcheon regarding the developments at Melbourne and am somewhat surprised at the results of drilling, in that the formations are not normal. We will be able to tell better what the true situation is when we have received and studied the samples.

It will be necessary, of course, to continue drilling through the shale and for some distance into the underlying limestone before an adequate supply of water may be expected.

I will write to you at more length when the samples have been received. Meanwhile, I should be very glad to hear from you on progress of drilling operations.

Very truly yours,

dGH:LM

H. G. Hershey

Melbourne U.W

1

Friday P.M. -

Have gone thro shale and now about 11 feet in rock at depth of 650'

The rock is sandstone and appears to be something like sandstone but very hard.

apparently have not hit any other water supply thus far.

advise us at once what to expect.

Will start casing first thing.

H Caratti

Dec. 7, 1939

Melbourne

Resumed crank
on core Tuesday
was reaming and
Casing
Down 225 feet.
218 to rock 7 feet
in rock.
Had cleaning out
and reaming to
get casing on rock
Will probably
start drilling in
next day or two.
Will notify you
soon as progress
starts again

H. F. Corbett

9-482
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300

Mr. Thos. W. Robinson
c/o Iowa Geological Survey
Iowa City, Iowa

December 1, 1938

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

Thank you very much for your card saying that the Melbourne town well was down about 200 feet and giving other information regarding the well.

I will be glad to hear from you when drilling is resumed.

Very truly yours,

HGH:LM

H. G. Hershey

Struck rock at
about 700 feet.
Have used up
all the Casing
and have about-
ing Casing.
Will advise you
further when
work is resum-
ed.

H K Corbett
Mechanic
Dry practically
all the way to rock

Show to
Mr. Robinson
Make separate U.W. Folder

November 28, 1938
Dict. November 26

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

Thank you for your report on the progress of the Melbourne well. I will be very glad to hear from you regarding further developments as the drilling progresses.

Very truly yours,

HGH:LM H. G. Hershey

Frank cards included addressed to Mr. T. W. Robinson, c/o I.G.S.

Resumed work on core last Wednesday. and cleaned out core hole at 80' last evening. Today. have gone to 106' depth. Still sand & gray silt Todate at about 100 feet.

H K Corbett
Melhanne La

Mr. Robinson

U.W. Melbourne
Marshall Co

March 7, 1939

Mr. Howard R. Green
208-210 Bever Building
Cedar Rapids, Iowa

Dear Mr. Green:

I have your letter of March 3 regarding the Melbourne well.

Your question concerning the water productivity of the Cedar Valley formation is difficult to answer. We have no reliable data on it near Melbourne. I have gone through our records carefully and can find only very meager information on this point.

About 1895 a well was drilled at Nevada to a depth of 980 feet, in which water was encountered at 940 feet. The well is reported to have produced 200 gallons per minute, but no mention is made of the static or pumping levels or of the quality of the water. From a driller's log of this well and later data, I interpreted the producing formation to be either Cedar Valley or Wapsipinicon. No mention of this acquifer is made in the reports on later wells drilled at Nevada.

It would seem logical to assume that the Cedar Valley formation, which is a good producer in the outcrop area and elsewhere, would have an adequate yield for the Melbourne supply. However, we have records showing that the Cedar Valley is a very poor producer in certain restricted areas.

A point which came out while I was working on the problem is that the Silurian at Nevada contains a considerable amount of gypsum. Water from the Silurian at Melbourne will probably be high in sodium and sulphate.

We will be very glad to receive your blue print of the log when it is completed. If possible, I am also anxious to obtain the well cuttings below 765 feet.

Very truly yours,

H. G. Hershey

HGH:RV

HOWARD R. GREEN COMPANY
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INVESTIGATIONS AND REPORTS
208-209-210 BEVER BUILDING
CEDAR RAPIDS, IOWA

March 3, 1939

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

Dear Dr. Hershey:

Thank you very much for your letter of March 2 enclosing identification of formations on the Melbourne well. It happens that we are just drawing up a progress log of the well up to 870 ft. depth and we will immediately enter this material on the log. Thank you very kindly for it. We will furnish you with blue printed copies of the log when completed. I wonder if you have any idea as to the water productivity of the Cedar Valley formation which you think is being penetrated at the present time. We should be glad to hear from you on this point.

Yours very truly,

HOWARD R. GREEN COMPANY

By H R Green

HRG:V

Marshall Co

February 18, 1938

Mr. Frank Becker, Mayor
Melbourne, Iowa

Dear Sir:

Your letter of February 17 to Dr. A. C. Trowbridge requesting a study of the formations at Melbourne in regard to finding a city water supply has been referred to me. I will be in Melbourne at 10:00 A.M. on Monday, February 21, to do this work, if the roads are passable. If it will be inconvenient for you to meet me at that time, please notify me some time Saturday.

Very truly yours,

H. G. Hershey

HGH:A

Melbourne, Iowa

February 17, 1938

A. P. Trowbridge

State Geologist

Iowa City, Iowa

Dear Sir:

Will you please send a man to make a study of the formation of land here in regard to finding water for a city water system which proposition will be voted on here in March.

Yours sincerely,

Frank Becker

Mayor

Gladbrook
Stewart Busch

April 19, 1939

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

I am sorry that this letter has been somewhat delayed.

Last Saturday I talked with Mr. McCutcheon about casing the Melbourne well and he assured me that from information received from his driller it will be necessary to case before drilling is continued. According to Mr. McCutcheon, the Maquoketa shale is caving badly and there is danger that the tools will be caught in the hole by a cave-in.

Upon returning to Iowa City I checked the data in our file pertaining to the St. Peter in the vicinity of Melbourne. According to our available information, the top of the St. Peter should occur at a depth of approximately 1745 feet, would be about 50 feet thick and should be overlain by a green shale. Our information on static level and production is limited so I can give you only approximate figures. The static level should be about 200 feet below the surface and production somewhat less than 50 gallons per minute.

The samples from the present bottom of the hole have not reached Iowa City and I am looking forward with interest to receiving and studying them.

Very truly yours,

HGH:LM

H. G. Hershey

CC: Howard R. Green

Static Head & Capacities of
St. Peter, Vic. of Melbourn

Town	County	Curt SL	PL	Cap.	Sealevel Static Head
Dysart (Os	Tama (	973	-120'	60 gpm	853
Urbana	Benton	947	-125'	35 gpm	822
Des Moines (Red Ice Cream)	Polk	929	-150	44 gpm	779
Greenwood Park Desmoines	"	872 ± 866			

Town Elev. from Alt. in Iowa

Bulletin #21

At Boone Head of St. Peter water is 1080' above sea level

at Vinton water from St. Peter rises 38' higher than that from Devonian. (802' Sea Level)

at Holstein water from St. Peter rose 40' & at Osage about 10' above that from higher water beds (Very Roughly 1180)

at Waterloo head of water from St. Peter is given at 865' above sea level

1050

Possible static level 850' (V. Rough estimate based on corrected static Head (of St. Peter) in Vol. 21

Well depth 930'
this P.M.
Now have 2.
shifts.
Been in solid
rock since
about 850'
Water level
remains the
same.
Driller seems
some encouraged
thinks water is
close

H Corbett

9 Marshall

1 Eng
1 St Dept
1 US
5 PWA
1 REI

REPORT ON CONSTRUCTION AND CHARACTERISTICS OF
MUNICIPAL WELL
Melbourne, Iowa
Section "A"
Municipal Waterworks System
Docket Iowa 1482-F
May 15, 1939

Owner: Incorporated Town of Melbourne, Iowa

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

General Contractor: Hoak Construction Co., West Des Moines, Iowa

Well Driller: McCutcheon Well Company, Des Moines, Iowa

Date drilling started: October 25, 1938

Date drilling completed: May 8, 1939

Total depth of well: 1,340 ft.

LOG OF WELL

Surface of ground at site of well, elevation 1,050 above sea level. Depth through drift to rock, 215 ft. Top 40 ft. of well has outside steel liner 16" diameter. Top 208 ft. of well cased with 10" G.W.I. casing. Top 100 ft. of well, the G.W.I. casing is grouted in place with Portland cement between casing and drill hole or between casing and outside liner. From depth 199 ft. to 656 ft. well is cased at 8" diameter with G.W.I. casing. From depth 654 ft. to 1,212 ft. well is cased with 6" diameter standard steel casing. From depth 1,212 ft. to bottom, 1,340 ft., 6" uncased drill hole.

From the above log showing the extreme depth of casing, each smaller size in turn having been run through the slightly larger casing above, the exceptionally straight alignment of the well is demonstrated. The reason for the unusual quantity of casing placed in the well is the frequent occurrence of bands of shale which were unstable when unsupported. However, the placing of this casing did not eliminate any material quantity of water as the maximum production shown by routine tests was 12 g.p.m. until a depth of 1,265 ft. had been reached. While drilling from depth 1,265 ft. to 1,297 ft. the static water level dropped from the previous elevation of 157 ft. below the surface to 217 ft. below the surface and then recovered to 201.9 ft. below the surface and remained there when the final depth of 1,340 ft. had been reached. The water now produced by the well is drawn from limestone (Dolometic) formations immediately above depth 1,297 ft. and from the latter depth to the bottom of the well at 1,340 ft. the formation is tentatively classified as Maquoketa shale. Excellent cooperation with Dr. Hershey of the State Geological Survey and his staff was had throughout. A

representative of this department witnessed the first seven hours of the final production test.

The final production test was run on May 10, 11 and 12, 1939. A remarkably good production record was established. The well in its present condition will produce considerably more than the required 50 gallons per minute with a very moderate draw down. In our opinion 200 g.p.m. could be produced if ever needed in the future.

SCHEDULE OF PRODUCTION TEST

Time	G.P.M.	Water Level	Specific Capacity	Remarks
May 10				
12:31 p.m.	-	201.9	-	Static
12:36	42	205.3	12.3	
1:45	42	205.3	12.3	54 1/2° F.
2:09	42	205.1	12.6	
2:41	40	206.6	10.5	57° F.
3:00	49	206.6	10.5	
3:30	50	206.9	10.0	
4:00	54	207.2	10.3	58° F.
4:30	54	207.7	9.3	
5:00	54	207.9	9.0	
5:30	54	208.1	8.8	
6:00	54	208.3	8.5	
7:00	54	207.5	9.7	59° F.
7:30	50	207.5	9.0	cyl. gadgets wearing
8:30	37	205.9	9.5	" " "
9:00	26	204.2	11.2	" " "
9:30	24	204.8	8.2	stopped to repair cyl.
May 11				
12:10 a.m.	0	201.9		started test again
12:15	52	206.4	11.6	
2:55	43	206.2	9.9	
3:30	46	206.6	9.8	
4:30	44	207.1	8.4	
5:00	58	209.1	8.0	
5:30	64	210.0	7.9	
6:00	63	210.2	7.6	
6:30	64	210.3	7.6	
7:00	64	210.7	7.3	
7:30	64	210.0	7.9	
8:30	67	210.5	7.7	
9:00	69	211.6	7.1	
10:00	69	211.7	7.1	
10:30	69	211.9	6.9	
11:30	69	212.1	6.7	
12:30	69	212.5	6.5	60° F.
1:30 p.m.	69	212.7	6.4	
2:00	69	212.7	6.4	
3:00	60	211.3	6.4	

Time	G.P.M.	Water Level	Specific Capacity	Remarks
May 11				
4:00	60	211.3	6.4	
5:00	60	211.4	6.3	
6:00	60	211.7	6.1	
7:00	60	211.0	6.6	
8:00	64	212.0	6.3	
8:30	63	212.1	6.2	
9:30	63	212.3	6.1	
10:30	63	212.2	6.1	
11:30	63	212.2	6.1	
11:35	74	214.3	6.0	
11:38	74	215.5	5.4	
11:45	95	218.7	5.7	
11:50	95	219.0	5.6	Stop test
	Recovery Observations			
11:51	0	214.0	-	
11:52	0	210	-	
11:53	0	207	-	
11:54	0	205	-	
11:55	0	204.0	-	
12:00	0	203.0	-	
May 12				
12:10 a.m.	0	202.0	-	

A copy of the laboratory report of analysis of a one gallon sample of water taken at 6:00 p.m., May 10, is as follows:

May 8, 1939

Mr. H. K. Corbett
Melbourne Consolidated School
Melbourne, Iowa

Dear Mr. Corbett:

Thank you very much for your complete report on developments in the Melbourne town well.

Within the past few days I have seen and talked with Mr. McCutcheon, Mayor Becker and Mr. Green. While in Melbourne on May 7 I tried to see you but was informed that you were out of town. Mr. Green told me that he would get in touch with the town officials today and probably you will know whether or not he has decided to run a pumping test by this time.

If a pumping test is run I should like to be there or to have one of the representatives of the Geological Survey present.

Very truly yours,

HGH:LM

H. G. Hershey

Melbourne Consolidated School

MELBOURNE, IOWA

May 8, 1929.

Mr. H.G.Herchey,
State Geological Survey,
Iowa City,
Iowa.

Dear Sir:-

The situation in regard to the melbourne well is about as follows at this date.

Have now reached a depth of 1340' and the static water level has taken a decided drop, standing at 217' Thursday morning and 205' yesterday morning. This in contrast to the 150 to 155' level at which it had been for so long. They are not working today so do not know what it is this morning.

1212' to 1240' was a limestone then from 1240 to 1265 a sort of lime and shale bands, then from 1265 to 1297 sandstone then back into lime to 1307. From 1307 to 1340 it has been a grayish brownish shale and quite oily.

McCutcheon seems to think that it should show a test of maybe 35 G.P.M. with that water level and suggested that we get in touch with you and Howard Green and perhaps you could be here Monday. However Green was here Thursday and knows what the water level is and thought that we should keep on drilling and the P.W.A. Res. Engineer Inspector also did not think that there was any more water than we had.

So with this information if you think that it is worth while for you to come up here in regard to the matter, is a question for you to decide. As I said it was McCutcheon's suggestion but aside from him, no one else thinks there is and new water.

Yours Truly,

H K Corbett.

Check with Mr. Mc.

Apr. 7, 1939

Memorandum

Subject: Melbourne, Marshall County Well No 1 [Drilling started Nov. 11, 1939.]

Mr. Orey Hicks reports very hard formation above sandstone beginning at 1265'

Water level 157 before sandstone struck. Water then dropped to 217' and recovered to 205 (Will probably come up higher later)

Oil show at .

Check with Driller

Casing Record:

218' of 10" W.I casing from surface to 218'

" 8" W.I. " " "

" 6" W. Steel " " to 1211

Water level & pumping data

	S.W.L.	Depth		Bottom of cylinder
	138	240		
1/6/39	138	521	11 gpm, dd complete	196 + 20' suction
3/31/39	147	1110	12 " " "	277

8435

Melbourne

1090

Top Dev.	480	570	
Thickness of Dev. Silur.		626 ± (617, 621, 640)	
Bottom . . Silur.		1196 ± (1187, 1191, 1210)	
Top of Mag (sh)		1115 ± (1140 - 1090)	1305
Thick of Mag (sh)		175 ± (150 - 200)	
Bottom of Mag		1290	
Top of Galena	- 240 =	1290	1435
Thick of Gal. Dec. Plat		410	
Thick to top Glen		440	
Thick of Glenwood		455	
Top of St. Peter	- 695	- 1745	1745
Top of Jordan		- 2325	

~~Sheffield bottom~~

440 Ames

Nevada 205 195

565 ± 285

250

585 - 565

1056 765 - 285

1056 887 169

Melbourne, Marshall Co

Oil reported at 1019' and 1340

Started Nov. 11, 1938
With drill

1185 - 1215 30' Light gray lime
6" set @ 1211

1215 - 1260 45' Light gray lime, green shale bands

1260 - 1265 5' Gray delem. Hard at bottom.

1265 - 1297 32 Sandstone. Water dropped from 157 to 217

1297 1306 9 Light colored limestone Water raised to 205'

1306 - (1240) Grayish brown shale getting more gray with depth.

Threads off of all pipe

WI 10" surf to 218
WI 8" 196 " 653 set at 563
Wrought Steel 6 630'6" " 570'6" set at 1211'

Melbourne

1177 - 1185 fossil

SWL	Depth		
138	240	dd complete	20' of suction
1/6/39 138	521	11 gpm	Cylinder 196
3/31/39 147	1110	12 gpm	" 277

MOORE'S MODERN METHODS

Melbourne City Well #1 W-0908

Pumping Test 5/10/39

WCS

Date	Time	Water Level	Interval DD	Total DD	Gpm	
5/10/39	12-14	204' 6¼"				Static level
	-23	201' 11"				" "
	-31					Started pumping
	-32	204' 3¼"				
	-34	204' 11¼"				
	-35	204' 11¾"				
	-36	205' 4"				
	-37-30	205' 4"				
	-38-40	205' 4"				
	-39-30	205' 2"				
	-40-30	205' 3"				
	-41-30	205' 2¾"				
	-42-30	205' 2"				
	-46-00				42 gpm	
	-47-	205' 1¼"				
	-50-	205' 0½"				
	-55-	205' 2¼"				
	1-01-30	205' 3"				
	1-05				42 gpm	Water milky, but clearing
	1-06-30	205' 3¼"				
	1-12-00	205' 3½"				
	1-15-					Temp 54 ½°
	1-17-30	205' 4½"				
	1-30-	205' 4"				
	1-45-	205' 4½"				
	1-50-					Water still milky
	1-58-					27 strokes/min.
	2-00-	205' 6¾"				
	2-09-	205' 1 ⅛"			40 gpm	
	2-10-	205' 1"				
	2-25-	204' 11¾"				
	2-32-					25 strokes/min.
	2-41-					Speed increased slightly
	2-45-	205' 6¼"				
	2-51-					Temp. 57°
	2-53-				49 gpm	
	2-56					29 strokes/Min.
	3-00	206' 7¾"				
	3-30	206' 11¼"				30 strokes/min

Melbourne Pumping Test continued

W-0908

4-00	207' 2½"		
4-07		54 gpm	Temp. 58°
4-36	207' 9½"		
5-00	207' 11"		31 strokes/min.
5-30	208' 1½"		
6-05	208' 3"		
6-11	208' 3¼"	57 gpm	
6-20	"	"	Temp. 59°
7-11	207' 5½"		

Diam Cylinder		4 3/4"
Length Stroke		22"
Diam Barrel		22"
Depth "		30"
Cap. meas & Calc	49.3 gals.	
Capac meas by Driller	52 gals	

Melbourne

From Mr. M. McCutcheon in Atkins
Dec 15, 1958

Drillers Log.

Gray drift		170	205	
" " thin sand layers	2	205	207	
Coal			207	
gray shale	8		210	
Light sh & hard bands	5		215	220' of 10" WI GHI
White sh	3		218	35 ±
Soft ls	2		220	
Brown ls	10		230	
SS & ls water SWL=100 in 10" g 5 min	10		240	
Brown ls & streaks green sh	30		270	
Gray sh	3		273	Poured in
ls	11		284	
Gray sh	3		287	
Brown ls	6		293	
Gray sh - hard bands	14		307	SWL - 160
Brown ls			335	(SS & thin ls water in 10") SWL 150 -

IOWA GEOLOGICAL SURVEY
Well or Water Sample Data Bottle No. _____

TOWN: _____ COUNTY: _____

LOCATION: _____ Sec. _____ T. _____ N., R. _____ E. W. _____ Twp.

OWNER OF WELL: City of Melbourn Well No. _____

USE OF WATER: City Supply (X); Private-Domestic ( ); Public Drinking ( ); Livestock ( ); Industrial ( ); School Supply ( ); Air Conditioning ( ); Cooling ( ); _____ ( ).

CONSTRUCTION OF WELL: Drilled (X); Gravel-Pack type ( ); Driven ( ); Dug ( ); Bored ( ); _____ ( ).

CONTRACTOR: McCutcheon DATE DRILLED: _____

CASING OR CURBING DATA: (Show by diagram on opposite side of sheet the kind, length and depth of top and bottom of each size of pipe, the amount of overlaps, position of seals or packers, pipe perforation and screens, etc.)

WELL DATA:
Curb Elevation _____ Ft. Present Depth 1110' Ft. Final Depth _____ Ft.

Topographic Position of Well: _____

Static Level (Depth to Water ~~(Above)~~ (Below) Curb) 138' Ft. Pumping Level 297' Ft.

Amount of Drawdown 297 (To) Ft. pumping at 12 g.p.m. in 3 hours ___ minutes.

Calculated gals. per ft. drawdown _____ g.p.m.

Capacity of Well 12 g.p.m. at 297' ft. drawdown.

Type of Pump Cylinder. Power Drilling Rig.

Depth of Bottom of Pump 277 ft. with 20 ft. of suction pipe.

TEMPERATURE: Air ___ °F.; Water ___ °F., measured after well had pumped ___ hrs. ___ mins. at ___ g.p.m.; ___ ft. from pump after water had passed through the following pipe _____ Time _____ (A.M.) (P.M.)

SOURCE OF WATER: Recent (Type and Depth) _____

Glacial Formations (Type) _____ at ___ ft. to ___ ft.

Limestone or Dolomite (Age) _____ at ___ ft. to ___ ft.

Sandstone (Age) _____ at ___ ft. to ___ ft.

Principal Producing Formation _____

REMARKS: _____

Sample taken for: Mineral Analysis (X); Sanitary Analysis ( ).
Data Collected by W. C. Schuldt; Date Apr. 8, 1939.
Report Analysis to H. G. Hershey, Iowa Geological Survey, Iowa City.

History

Pumped 3 hrs. Friday stopped 5:00 Water level 297' at 12 gpm (static level 138') dropped rapidly (30 min) pumping about 30 gpm. Sple taken 8 O'clock Tues. Morning (water level 147' (No tools in hole - water brought up with Bailer

Top Maquoketa 1095

Cased To 653'

10" To 218

8" To 653 (Top 198')

Believes water came from 230-240' - Not Tested

June 13, 1939

Mayor F. Becker
Melbourne, Iowa

Dear Mr. Becker:

At the request of Mr. H. K. Corbett, chairman of the Melbourne Water Committee, I am writing to you in regard to the possibility of having obtained a sufficient quantity of water above rocks of Silurian age in the new Melbourne well.

Since representatives of the Iowa Geological Survey observed only the last pumping test that was run on the well, we can site only that test from first-hand information. However, I have no reason to doubt the reports of the driller and engineer on the earlier tests. A review of the earlier test as reported by the driller and the test observed by Mr. W. C. Schuldt of this department follow:

Depth	Static Water Level	Pumping Water Level	Drawdown	Production in Gallons per Minute	Source of Information
507	138	200	83	11	Driller
1110	147	277	130	12	Driller
1340	202	208	6	54	Iowa Geol. Survey

From these tests and from the detailed report of the driller, particularly in regard to water levels during the construction of the well, I conclude that there was not sufficient water above the aquifer tested by the last pumping test to give the town of Melbourne an adequate water supply.

It is my opinion, based on the information available to me, that the well was constructed in accordance with normal well-drilling practice.

If you have any questions regarding the above statements or if we can be of further assistance, please feel free to call on us.

Very truly yours,

H. G. Hershey

HGH:LM

IOWA GEOLOGICAL SURVEY
Preliminary
Generalized Log

WC.5
Mar. 1, 1939

MELBOURNE CITY WELL

Marshall County, Logan Twp. NW¼,SW¼,SW¼,NE¼,Sec. 6, T.82N.,R.19W.

Contractor McCutcheon Well Co. Curb Elevation 1050'

W-0908

Sple. No.	Description	Thick	From	To
	PLEISTOCENE SYSTEM Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65'	0	65'
2.	Drift, gray, coarse sandy, calcareous, micaceous	95'	165'	160'
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reworked Pennsylvanian shale	10'	160'	170'
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10'	170'	180'

~~Iowa Geological Survey.~~ W-0908 W-0908

~~Preliminary~~
~~Generalized Log~~

~~MELBOURNE CITY WELL~~

~~Marshall County, Logan Twp.~~ ~~NW¼,SW¼,SW¼,NE¼, Sec. 6, T. 82N., R.19W.~~

~~Contractor McCutcheon Well Co.~~ ~~Curb Elevation 1050'~~

~~W-0908~~

Sple. No.	Description	Thick	From	To
	PENNSYLVANIAN SYSTEM Des Moines Series			
5.	Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite	30'	180'	210'
	MISSISSIPPIAN SYSTEM Meremec Series St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone. ~~Driller reports white shale 215'-218'~~	5'	210'	215'
~~7.~~	~~Shale, white, (from drillers log)~~	~~3'~~	~~215'~~	~~218'~~
7.	Limestone, light gray to buff, fine crystalline, soft, Driller reports white shale 215'-218'	11 ~~8'~~	215 ~~218'~~	226'
	~~Kinderhook Series.~~ ~~Hampton Formation~~			
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235-240' and 250'-255'	34'	226'	260'
	Osage Series ? Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275' Drillers log shows 4 streaks green shale at 270'	24'	260'	284'
10.	Shale, medium gray, unctuous, soft, non-calcareous	3'	284'	287'
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13'	287'	300'
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (drillers log shows gray shale with hard bands from 293-307'	7'	300'	307'
13.	Dolomite, brown fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica, and chert in lower 10'	23'	307'	330'
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40'	330'	370'
15.	~~Dolomite, drab to buff, fine~~			

Sple. No.	Description	Thick	From	To
	Kinderhook Series			
	Hampton Formation			
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16'	370'	386'
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent.	19'	386'	405'
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5'	405'	410'
18.	Limestone, gray, fine crystalline to flaky textured	5'	410'	415'
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15'	415'	430'
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	3'	430'	433'
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17'	433'	450'
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30'	450'	480'
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert(leached in upper part).	20'	480'	500'
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2'	500'	502'
	Maple Mill Formation			
25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68'	502'	570'
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% ~~course~~ Coarse irregular quartz masses	7'	570'	577'
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured cherty dolomite at approximately 600'	56'	577'	633'
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline, transluscent; 10% ~~course~~ Coarse irregular quartz masses in lower half	33'	633'	666'
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower ~~half~~ 6 feet	24'	666'	690'
30.	Shale, light greenish gray, calcareous	15'	690'	705'

2/28/39

W 0908

Sple. No.	Description	Thick	From	To
31.	Dolomite, drab to brown, fine crystalline, transluscent, with thin band limestone at top	7'	705'	712'
32.	Shale, light gray, calcareous, with occasional thin bands of brown dolomite	~~58'~~ 63	712'	~~765'~~ 775
	Shell Rock Formation			
33.	Dolomite, brown, medium crystalline in upper part, medium to fine in lower part, with buff band 800'-805' Traces gypseum	40'	775'	815'
34.	Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure	27'	815'	842'
35.	Dolomite, brown, fine granular texture, hard, trace gypsum	8'	842'	850'
36.	Shale or siltstone, light brownish gray, fair shaly structure	5'	850'	855'
	Cedar Valley & Wapsipinicon Formations			
37.	Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum	15'	855'	870'
38.	Dolomite, drab gray, coarse crystalline, clastic (?) weak	10'	870'	880'
39.	Dolomite, light buff, coarse crystalline, clastic (?) weak	20'	880'	900'
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white limestone with euhedral dolomite crystals between 915-920'. Traces gypsum	30'	900'	930'
41.	No Sample	5'	930'	935'
42.	Dolomite, light brown to drab gray, fine to medium crystalline, hard, with small percentage interstitial gypsum	30'	935'	965'
43.	Gypsum, white, massive bedded, in part brown or black	20'	965'	985'
44.	Dolomite, brown to red brown, fine to extremely fine crystalline, hard, vitreous, with small percentages interstitial gypseum in lower part	45'	985'	1030'
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain textured chert ~~frem~~ and traces gypsum	20'	1030'	1050'
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20% gypsum in lower 30'	49'	1050'	1099'
47.	Shale, light green, silty, fair shaly structure	6'	1099'	1105'
48.	Dolomite, light brown, fine to medium crystalline	5'	1105'	1110'
49.	Shale, light gray, non-calcareous, entirely as mud	5'	1110'	1115'

		Thick	From	To
50.	Dolomite, soft, ~~ar-shaley~~ light gray, fine crystalline, weak, porous, with small percentages gypseum. Dolomite drills to mud	30'	1115'	1145'
51.	Gypsum, white, massive bedded	20'	1145'	1165'
52.	Shale, red, dense, and shale green gray, slightly unctuous, sandy (10% medium quartz sand)	10'	1165'	1175'
	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, transluscent, massive bedded, with small percentage red and green shale cave, increas- in quantity in lower 15'	55'	1175'	1230'
54.	Dolomite, very fine crystalline, very hard, with 10-20% drab gray chert, part of which may be cave, and 25% red and green sandy shale	20'	1230'	1250'
55.	Dolomite, light buff, very fine crystalline, transluscent, vitreous, sandy in lower 5'	20'	1250'	1270'
56.	Dolomite, dlght drab to green, fine crystalline, trans- luscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	35'	1270'	1305'
	Ordovician System Maquoketa Formation			
57.	Shale, green and chocolate brown interbanded, micaceous	10'	1305'	1315'
58.	No Sample	10'	1315±	1325'
59.	Shale, green, gray, and brown, soft, and hard, fair shaly structure	15'	1325'	1340'

////////////

W-0908

Generalized Log

MELBOURNE CITY WELL
Marshal County, Logan Twp.

NW¼,SW¼,SW¼,NE¼ Sec. 6, T. 82N., R 19W.

Contractor McCutcheon Well Co. Curb Elevation: 1050'

SPLE. NO.	Description	Thick	From	To
	PENNSYLVANIAN SYSTEM DESMOINES SERIES			
1.	Shale, light to dark gray, non calcareous, with ~~5%~~ Thin coal (Base of 205') and less than 1% pyrite	5'	205'	210'
	MISSISSIPPIAN SYSTEM MEREMEC SERIES ~~St. Genevieve Formation (?)~~			
2.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite, and with occasional bands of hard gray limestone.	5'	210'	215'
	shale, white, (From drillers log)	3'	215' - 218'	
	St. Louis Formation			
3.	Limestone, very light gray to buff, fine crystalline, soft, with 5% very light green, soft, calcareous shale ~~(Driller's log shows 3' white shale to 218'~~ in upper 2'	8'	218'	226 ~~220'~~
4.	~~Limestone, light buff to light gray, fine crystalline, soft,~~	~~6'~~	~~220'~~	~~226'~~
	KINDERHOOK SERIES Hampton Formation			
5.	Dolomite, light drab, fine crystalline, with trace of chert	9'	226'	235'
6.	Dolomite, light buff to brown, ~~sandy-or~~ with thin bands of sandstone; sand medium to coarse, curvilinear, frosted, 10%	5'	235'	240'
7.	Dolomite, light buff, fine crystalline, with small percentage green shale - ~~Glenwood Type~~	10'	240'	250'
8.	Dolomite, brown, very fine crystalline texture, with 5% light gray dolomitic sandstone; trace of chert	5'	250'	255'
9.	Dolomite, brown, very fine crystalline, translucent	5'	255'	260'
~~10.~~	~~Dolomite, brown, very fine crystalline, with 60%~~			

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		Thick	From	To
10.	Dolomite, brown, very fine crystalline, with 60% brown to gray chert. Authigenic quartz e crystals common between 270' and 275' (Driller's log records 4 streaks green shale at 270')	24'	260'	284'
11.	Shale, medium gray, unctuous, soft, non-calcareous (Driller's log records 3' gray shale 284-287')	3'	284'	287'
12.	Dolomite, light gray, fine crystalline, hard, with much shale mud	3'	287'	290'
13.	Dolomite, brown to blue, with much chert, fine crystalline, soft	10'	290'	300'
14.	Shale, medium gray (actually a siltstone), with fragments of black shale, and bands of brown dolomite (Drillers log records gray shale with hard bands from 293' to 307' [Why not call it siltstone??]	5'	300'	305'
15.	Shale, medium gray and similar to above, but grading from siltstone to very fine sandstone. With band of highly glauconitic, very fine crystalline dolomite. Shale contains considerable massive quartz and chert.	2'	305'	307'
16.	Dolomite, brown, fine crystalline, soft, with 40% gray shale. Some glauconiferous dolomite	13'	307'	320'
17.	Dolomite, brown to gray, fine crystalline, with much massive quartz, opaline silica, and chert. trace of yellow sandstone, pyritic	10'	320'	330'
18.	Dolomite, light gray, fine crystalline, moderately soft	25'	330'	355'
19.	Dolomite, light gray, fine crystalline, green speckled with glauconite	15'	355'	370'
20.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16'	370'	386'
21.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix	14'	386'	400'
22.	Limestone, slightly dolomitic, light buff to light gray, fine crystalline, transluscent	5'	400'	405'
23.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5'	405'	410'
24.	Limestone, gray, fine crystalline to flaky textured	5'	410'	415'
25.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15'	415'	430'
26.	Shale, dark gray, unctuous, flaky cleavage, with thin band of sandstone above or below	3'	430'	433'

		Thick	From	To
27.	Limestone, light buff to light gray, very fine crystalline, dark mottled in parts in upper 5'. Occasional quartz grains	17'	433'	450'
28.	Dolomite, drab gray, fine crystalline, hard, porous, with 50% light gray, dark mottled chert	10'	450'	460'
29.	Dolomite, calcareous, drab gray, fine crystalline, slightly porous in parts	20'	460'	480'
30.	Limestone, light drab gray ~~to drab~~, fine crystalline, porous~~, in upper part~~ with 10% chert, weathered in upper 5'	10'	480'	490'
31.				
31.	Limestone, drab, fine crystalline, transluscent, with small percentage pyrite some oolitic chert	10'	490'	500'
	English River Formation			
32.	Sandstone, medium to coarse loose sand and fine ~~do~~ dolomite or pyrite cemented sandstone fragments. With band drab dolomite above or below	2'	500'	502'
	Maple Mill Formation			
33.	Shale, light green gray, calcareous, hard, poor shaly structure. With streaks of olive green and chocolate brown shale in lower 15'	68'	502'	570'
	DEVONIAN SYSTEM Sheffield Formation			
34.	Dolomite, light gray, fine crystalline, porous, with 15% light gray, blue speckled chert and 5% of very coarse irregular quartz sand grains	7'	570'	577'
35.	Shale, light gray, slightly calcareous, ~~dark~~	23'	577'	600'
36.	Sandstone, medium grained, angular, red and cemented with iron oxide in upper part.	1'	600'	601'
37.	Dolomite, light gray, fine granular texture, porous, with light gray, blue mottled chert	1'	601'	602'
38.	Shale, light gray, calcareous, soft, poor shaly structure	33'	602'	633'
39.	Dolomite, drab, fine granular texture, transluscent,	17'	633'	650'
40.	Dolomite, drab, fine crystalline, transluscent, hard with 10% medium to coarse irregular quartz sand grains	16'	650'	666'
41.	Limestone, light buff, subcrystalline, subtransluscent, hard, fossiliferous	18'	666'	684'
42.	Limestone, light buff to gray, fine crystalline, with 15% medium quartz sand	6'	684'	690'
43.	Shale, light gray to green gray, calcareous, entirely as well mud	15'	690'	705'
44.	Limestone, light buff, subcrystalline, subtransluscent	1'	705'	706'
45.	Dolomite, drab to brown, fine crystalline, transluscent, hard	6'	706'	712'

W-8908

		Thick	From	To
46.	Shale, light gray, calcareous, entirely as well mud. possible occasional thin bands of brown dolomite	53'	712'	765'

Gray shale set at
1095'. gray until
1168'. then red
to 1195. depth this
evening about 6 P.M.
Driller says this
red is the real
Maquoketa shale
gummy & very
sticky

H K Carlett
Mechanic

Melbourne

Fred Witt

115 TD

130 static

160± @ 7 gpm

11' below Milwaukee

Verners Driller Nov. 1936

Rock 200'

Sh. at 130 - 140

200' of 5"

4" below

Luthi

260'

Static above 180'

Pumps down under heavy pumping

4" casing

Gus Pedemeyer

190' deep

Wednesday
Into Stone today
hit the stone
about 1197 - 1197
Have also hit
small band of
green. but not
much as green
as yet.
Depth this morning
1205 feet. still in
lime stone or
Dolomite.
No change in stone

H K Corbett
Mechanic

Monday—
Resumed drilling.
Monday P.M.
Cased to 1210 feet.
Monday cor 1222½ feet
and hitting small
strips of shale.
Driller said
Nothing to Later-
so far.
— Tuesday —
1240 feet at 6 P.M.
Driller thinks the
shale may be
Coming down side
of casing. as it is
Not sealed as yet.
2 full shifts every
day.
H Corlett

Thursday P.M.

Water dropped about 60' over Nite. Had about 215' down

Was just over to coal and it seems we are in sand.

Very hard to bail anything out but water

Present depth 1270'

Fred Clarkett carpenter

Feel more encouraged.

Melbourne, Marshall

HOWARD R. GREEN CO.

Consulting Engineers

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

208-209-210 BEVER BUILDING, CEDAR RAPIDS, IOWA

May 23, 1939

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

re: Melbourne, Iowa

Dear Dr. Hershey:

We return herewith your copy of the "Generalized Log" in connection with the Melbourne well together with an additional copy which we have made. Thank you kindly. We also enclose a copy of our complete report on the well.

Yours very truly,

HOWARD R. GREEN COMPANY

By H. R. Green V

V

Enc.

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

Name of Well: Melbourne City Well Survey No. W-0908

Drilled by: McCutcheon Well Co. Date Dec., 1938-May, ,1939

Total Depth: 1340 ft; Curb Elevation: 1050 ft; Static Level: ____ ft.

Casing Data: ____

Pump and Screen Data: ____

Pumping Test: ____ Hours ____ Min; Gal. Per Min. ____; Drawdown ____ ft. in ____ min.

Description of Formations

No.	Rock Unit	Thick.	From (Feet)	To
	PLEISTOCENE SYSTEM			
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65	0	65
2.	Drift, gray, coarse sandy, calcareous, micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reworked Pennsylvanian shale)	10	160	170
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10	170	180
	PENNSYLVANIAN SYSTEM			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite	30	180	210
	MISSISSIPPIAN SYSTEM			
	Meremec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone	5	210	215
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11	215	226
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235'-240' and 250'-255'	34	226	260
	Osage Series			
	Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275'. Driller's log shows 4 streaks green shale at 270'	24	260	284

Notes:

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
10.	Shale, medium gray, unctuous, soft, non-calcareous	3	284	287
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13	287	300
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with hard bands from 293'-307')	7	300	307
13.	Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica, and chert in lower 10'	23	307	330
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
	Kinderhook Series			
	Hampton Formation			
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16	370	386
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent	19	386	405
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5	405	410
18.	Limestone, gray, fine crystalline to flaky textured	5	410	415
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15	415	430
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	3	430	433
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17	433	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30	450	480
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in upper part)	20	480	500
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2	500	502

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	Maple Mill Formation			
25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68	502	570
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	7	570	577
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured cherty dolomite at approximately 600'	56	577	633
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline, transluscent; 10% coarse irregular quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower 6 feet	24	666	690
30.	Shale, light greenish gray, calcareous	15	690	705
31.	Dolomite, drab to brown, fine crystalline, transluscent with thin band limestone at top	7	705	712
32.	Shale, light gray, calcareous, with occasional thin bands of brown dolomite	63	712	775
	Shell Rock Formation			
33.	Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 800'-805'. Traces of gypsum	40	775	815
34.	Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure	27	815	842
35.	Dolomite, brown, fine granular texture, hard, trace gypsum	8	842	850
36.	Shale or siltstone, light brownish gray, fair shaly structure	5	850	855
	Cedar Valley and Wapsipinicon Formations			
37.	Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum	15	855	870

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
38.	Dolomite, drab gray, coarse crystalline, clastic(?) weak	10	870	880
39.	Dolomite, light buff, coarse crystalline, clastic(?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white limestone with euhedral dolomite crystals between 915'-920'. Traces gypsum	30	900	930
41.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium crystalline, hard, with small percentage interstitial gypsum	30	935	965
43.	Gypsum, white, massive bedded, in part brown or black	20	965	985
44.	Dolomite, brown to red brown, fine to extremely fine crystalline, hard, vitreous, with small percentages interstitial gypsum in lower part	45	985	1030
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain textured chert and traces gypsum	20	1030	1050
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20% gypsum in lower 30'	49	1050	1099
47.	Shale, light green, silty, fair shaly structure	6	1099	1105
48.	Dolomite, light brown, fine to medium crystalline	5	1105	1110
49.	Shale, light gray, non-calcareous, entirely as mud	5	1110	1115
50.	Dolomite, soft, light gray, fine crystalline, weak, porous, with small percentages gypsum. Dolomite drills to mud	30	1115	1145
51.	Gypsum, white, massive bedded	20	1145	1165
52.	Shale, red, dense, and shale green gray, slightly unctuous, sandy (10% medium quartz sand)	10	1165	1175

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, translucent, massive bedded, with small percentage red and green shale cave, increase in quantity in lower 15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystalline, very hard, with 10-20% chert, part of which may be cave, and 25% red and green sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystalline, transluscent, vitreous, sandy in lower 5'	20	1250	1270
56.	Dolomite, light drab to green, fine crystalline, transluscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	35	1270	1305
	ORDOVICIAN SYSTEM			
	Maquoketa Formation			
57.	Shale, green and chocolate brown interbanded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	Shale, green, gray, and brown, soft, and hard, fair shaly structure	15	1325	1340

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

Name of Well: Melbourne City Well Survey No. W-0908

Drilled by: McCutcheon Well Co. Date: December 1938-May 1939

Total Depth: 1340 ft. Curb Elevation: 1050 ft. Static Level: ft.

Casing Data:

Pump and Screen Data:

Pumping Test: Hours Min; Gal.per Min. ; Drawdown ft.in min.

Description of Formations

No.	Rock Unit	Thick	From	To
	PLEISTOCENE SYSTEM			
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65	0	65
2.	Drift, gray, coarse sandy, calcareous, micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reworked Pennsylvanian shale)	10	160	170
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10	170	180
	PENNSYLVANIAN SYSTEM			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite	30	180	210
	MISSISSIPPIAN SYSTEM			
	Meremec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone	5	210	215
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11	215	226
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235'-240' and 250'-255'	34	226	260
	Osage Series			
	Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275'. Driller's log shows 4 streaks green shale at 270'	24	260	284

Notes:

Melbourne City Well Generalized Log

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
10.	Shale, medium gray, unctuous, soft, non-calcareous	3	284	287
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13	287	300
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with hard bands from 293'-307')	7	300	307
13.	Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica and chert in lower 10'	23	307	330
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
	Kinderhook Series			
	Hampton Formation			
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16	370	386
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent	19	386	405
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5	405	410
18.	Limestone, gray, fine crystalline to flaky textured	5	410	415
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15	415	430
20.	Shale, drak gray, unctuous, flaky cleavage; thin band sandstone above or below	3	430	433
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17	433	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30	450	480
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in upper part)	20	480	500
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2	500	502

Melbourne City Well Generalized Log

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25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68	502	570
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	7	570	577
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured cherty dolomite at approximately 600'	56	577	633
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline, translucent; 10% coarse irregular quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower 6 feet	24	666	690
30.	Shale, light greenish gray, calcareous	15	690	705
31.	Dolomite, drab to brown, fine crystalline, translucent with thin band limestone at top	7	705	712
32.	Shale, light gray, calcarioues, with occasional thin bands of brown dolomite	63	712	775
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33.	Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 800'-805. Traces of gypsum	40	775	815
34.	Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure	27	815	842
35.	Dolomite, brown, fine granular texture, hard, trace gypsum	8	842	850
36.	Shale or siltstone, light brownish gray, fair shaly strucuture	5	850	855
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Melbourne City Well Generalized Log

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
38.	Dolomite, drab gray, coarse crystalline, clastic (?) weak	10	870	880
39.	Dolomite, light buff, coarse crystalline, clastic (?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white limestone with euhedral dolomite crystals between 915'-920' Traces gypsum	30	900	930
41.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium crystalline, hard, with small percentage interstitial gypsum	30	935	965
43.	Gypsum, white, massive bedded, in part brown or black	20	965	985
44.	Dolomite, brown to red brown, fine to extremely fine crystalline, hard, vitreous, with small percentages interstitial gypsum in lower part	45	985	1030
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain textured chert and traces gypsum	20	1030	1050
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20% gypsum in lower 30'	49	1050	1099
47.	Shale, light green, silty, fair shaly structure	6	1099	1105
48.	Dolomite, light brown, fine to medium crystalline	5	1105	1110
49.	Shale, light gray, non-calcareous, entirely as mud	5	1110	1115
50.	Dolomite, soft, light gray, fine crystalline, weak, porous, with small percentages gypsum. Dolomite drills to mud	30	1115	1145
51.	Gypsum, white, massive bedded	20	1145-	1165
52.	Shale, red, dense, and shale green gray, slightly unctuous, sandy (10% medium quartz sand)	10	1165	1175

Melbourne City Well Generalized Log

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	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, translucent, massive bedded; with small percentage red and green shale cave, increase in quantity in lower 15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystalline, very hard, with 10-20% chert, part of which may be cave, and 25% red and green sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystalline, translucent, vitreous, sandy in lower 5'	20	1250	1270
56.	Dolomite, light drab to green, fine crystalline, translucent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	35	1270	1305
	ORDOVICIAN SYSTEM			
	Maquoketa Formation			
57.	Shale, green and chocolate brown interbanded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	Shale, green, gray, and brown, soft, and hard, fair shaly structure	15	1325	1340

May 16, 1939

Mr. F. S. McCutcheon
McCutcheon Well Company
Des Moines, Iowa

Dear Mr. McCutcheon:

In completing our work on the Melbourne city well we find that we have a complete set of samples from 0 to 1340 feet except one sample from 930 to 935 feet and two samples from 1315 to 1320 feet and 1320 to 1325 feet. We are extremely anxious to obtain these samples and will appreciate it if you can fill the gaps. I realize that you may not have any of the samples in Des Moines, in which case, please disregard this request. I will write to Mr. Corbett at Melbourne and ask him to check over the samples if they are there.

Sometime ago we sent you a small supply of sample sacks. Our own supply here in Iowa City is quite low and because of our limited budget we are attempting to make them last until July 1. However, we still have a few sacks and will be glad to send them to you if you need them.

I hope sincerely that your recovery is progressing and that you will soon be at home again.

Very truly yours,

HGH:LM

H. G. Hershey

May 16, 1939

Mr. H. K. Corbett
Melbourne, Iowa

Dear Mr. Corbett:

In bringing our record of the Melbourne well up to date, we find that we have a complete set of samples from 0 to 1340 feet except one sample at 930 to 935 feet and two samples at 1315 to 1320 feet and 1320 to 1325 feet. We are extremely anxious, of course, to obtain the samples which are lacking and will appreciate it greatly if you will see if they are at Melbourne.

The results of the mineral analysis of water from the new Melbourne well have not been received from the State Water Laboratory, but we are expecting them within the next few days.

Very truly yours,

HGH:LM

H. G. Hershey

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

W-0908

RECORD OF WELL

Location:

Town: Melbourne (N E / S W); County Marshall E.

NW-SW-SW-NE sec. 6 T. 92 N., R. 19 W. Logan Twp.

Well name and number Melbourne City Well #1

Owner _____ Address _____

Tenant _____ Address _____

Contractor McCutcheon Well Co. Address Des Moines

Drillers Orey Hicks (Howard Green, Engineer)

Drilling dates Oct. 25, 1938 - May 8, 1939.

Well data:

Elevations: Drilling curb 1050 feet; Land surface _____ feet

Determined by _____

Topographic position _____

Total depth: Reported 1340 feet, Measured 1340 feet

Drilling method cable tool

Hole and casing data 0-40' outside steel liner 16" diameter, 10" casing
(Give amount, size, kind, and depth of all casing; type and
from 0-208' - cemented. 457 of 8" casing from 199' to
position of seals and packers; cementing; how finished--perforated pipe, screen,
654', 458' of 6" casing from 654' to 1212',
gravel pack, open hole, etc.)
6" open hole 1212 - 1340.

Original depth to water 201.1 ft. ~~above~~ below curb Date _____

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

Sources of water: Principal Silurian 1297-1340; Others _____

Production data: Date May 10, 11, 12, 1939

Static depth to water 201.9 Measuring point

Pumping level 206.9 at 50 g.p.m.

211.7 69

219.0 95

Specific capacity 7.1 ± g.p.m. per ft. drawdown; Temperature 59 °F.

Pump data; Type pump Column Dia. Length

Cylinder or bowls: Dia. Length Suction pipe

Power Airline

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

Use of water

WATER ANALYSES (in parts per million)

Date sampled	May 19 1939	July 18, 1949		
Sampled by	W.C. Schuldt	Q.W. Lane		
Total solids	3472	4330		
Insoluble matter	22	46		
Alkalinity (Meo)	228.0	220		
Alkalinity (Phn)	0.0	0		
pH	7.0	7/25/49 7.3		
Fe_2O_3+ Mn_2O_3+Al_2O_3	7.0	27		
Alkali as sodium	311.2	635.9		
Calcium	—	476.3		
Magnesium	122.5	113.1		
Iron (unfiltered)	9.0	6.75		
Manganese	0.18	0		
Nitrate	0.0	0		
Fluoride	1.0	1.9		
Chloride	58.0	170		
Sulfate	2037.3	2499		
Bicarbonate	278.2	268.4		
Hardness (ppm)	1716	1667		
Hardness (gpg)	100.3	97.3		

Remarks

Laboratory data: Sample storage location

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

Spls. prepared by Unklesbay & Yoho Washed range by

Driller's log and cond. Yes

Insoluble residues: Prepared by Studied by Strip log

Microscopic study W.C.S. Conselman, Harp strip log Schuldt, Conselman

Gen. log ✓ Correl. by "

WATER LEVEL DATA

Measuring point _____

Date	Depth to water	Altitude	Remarks

REMARKS

Pumping test at top Maple Mill - 507'. SWL = 117½ 11gpm with 83'd.d.

Oil show reported at 1019' and 1340'

REPORT ON CONSTRUCTION AND CHARACTERISTICS OF
MUNICIPAL WELL
Melbourne, Iowa
Section "A"
Municipal Waterworks System
Docket Iowa 1482-F
May 15, 1939

Owner: Incorporated Town of Melbourne, Iowa

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

General Contractor: Hoak Construction Co., West Des Moines, Iowa

Well Driller: McCutcheon Well Company, Des Moines, Iowa

Date drilling started: October 25, 1938

Date drilling completed: May 8, 1939

Total depth of well: 1,340 ft.

LOG OF WELL

Surface of ground at site of well, elevation 1,050 above sea level. Depth through drift to rock, 215 ft. Top 40 ft. of well has outside steel liner 16" diameter. Top 208 ft. of well cased with 10" G.W.I. casing. Top 100 ft. of well, the G.W.I. casing is grouted in place with Portland cement between casing and drill hole or between casing and outside liner. From depth 199 ft. to 656 ft. well is cased at 8" diameter with G.W.I. casing. From depth 654 ft. to 1,212 ft. well is cased with 6" diameter standard steel casing. From depth 1,212 ft. to bottom, 1,340 ft., 6" uncased drill hole.

From the above log showing the extreme depth of casing, each smaller size in turn having been run through the slightly larger casing above, the exceptionally straight alignment of the well is demonstrated. The reason for the unusual quantity of casing placed in the well is the frequent occurrence of bands of shale which were unstable when unsupported. However, the placing of this casing did not eliminate any material quantity of water as the maximum production shown by routine tests was 12 g.p.m. until a depth of 1,265 ft. had been reached. While drilling from depth 1,265 ft. to 1,297 ft. the static water level dropped from the previous elevation of 157 ft. below the surface to 217 ft. below the surface and then recovered to 201.9 ft. below the surface and remained there when the final depth of 1,340 ft. had been reached. The water now produced by the well is drawn from limestone (Dolometic) formations immediately above depth 1,297 ft. and from the latter depth to the bottom of the well at 1,340 ft. the formation is tentatively classified as Maquoketa shale. Excellent cooperation with Dr. Hershey of the State Geological Survey and his staff was had throughout. A

representative of this department witnessed the first seven hours of the final production test.

The final production test was run on May 10, 11 and 12, 1939. A remarkably good production record was established. The well in its present condition will produce considerably more than the required 50 gallons per minute with a very moderate draw down. In our opinion 200 g.p.m. could be produced if ever needed in the future.

SCHEDULE OF PRODUCTION TEST

Time	G.P.M.	Water Level	Specific Capacity	Remarks
May 10				
12:31 p.m.	-	201.9	-	Static
12:36	42	205.3	12.3	
1:45	42	205.3	12.3	54½° F.
2:09	42	205.1	12.6	
2:41	40	206.6	10.5	57° F.
3:00	40	206.6	10.5	
3:30	50	206.9	10.0	
4:00	54	207.2	10.3	58° F.
4:30	54	207.7	9.3	
5:00	54	207.9	9.0	
5:30	54	208.1	8.8	
6:00	54	208.3	8.5	
7:00	54	207.5	9.7	59° F.
7:30	50	207.5	9.0	cyl. gadgets wearing
8:30	37	205.9	9.5	" " "
9:00	26	204.2	11.2	" " "
9:30	24	204.8	8.2	stopped to repair cyl.
May 11				
12:10 a.m.	0	201.9		started test again
12:15	52	206.4	11.6	
2:55	43	206.2	9.9	
3:30	46	206.6	9.8	
4:30	44	207.1	8.4	
5:00	58	209.1	8.0	
5:30	64	210.0	7.9	
6:00	63	210.2	7.6	
6:30	64	210.3	7.6	
7:00	64	210.7	7.3	
7:30	64	210.0	7.9	
8:30	67	210.5	7.7	
9:00	69	211.6	7.1	
10:00	69	211.7	7.1	
10:30	69	211.9	6.9	
11:30	69	212.1	6.7	
12:30	69	212.5	6.5	60° F.
1:30 p.m.	69	212.7	6.4	
2:00	69	212.7	6.4	
3:00	60	211.3	6.4	

Time	G.P.M.	Water Level	Specific Capacity	Remarks
May 11				
4:00	60	211.3	6.4	
5:00	60	211.4	6.3	
6:00	60	211.7	6.1	
7:00	60	211.0	6.6	
8:00	64	212.0	6.3	
8:30	65	212.1	6.2	
9:30	63	212.3	6.1	
10:30	63	212.2	6.1	
11:30	63	212.2	6.1	
11:35	74	214.3	6.0	
11:38	74	215.6	5.4	
11:45	95	218.7	5.7	
11:50	95	219.0	5.6	Stop test
	Recovery Observations			
11:51	0	214.0	-	
11:52	0	210	-	
11:53	0	207	-	
11:54	0	205	-	
11:56	0	204.0	-	
12:00	0	203.0	-	
May 12				
12:10 a.m.	0	202.0	-	

A copy of the laboratory report of analysis of a one gallon sample of water taken at 6:00 p.m., May 10, is as follows:

IOWA GEOLOGICAL SURVEY
Water Analysis Report

County: Marshall — Date Sampled: May 10, 1939

Town: Melbourne — Sampled by: W. C. Schuldt

Location of Well: NW¼,SW¼,SW¼,NE¼, Sec. 6, T. 82 N., R 19 W.

Logan Twp.

Owner: City of Melbourne — Well No. L — T.D. 1,340 ft.

Type of well: Drilled — Static Level: 201'-11" — Curb elevation: 1050 ft.

Producing Formation: Silurian — Depth range: 1265 to 1306 feet

Remarks on Condition of Well, Casing or Formations: 16" casing 41' from 1' above ground to 40' below. 10" casing 218' from ground level to 218' below. 8" casing 457' from 10 or 12 feet above bottom of 10" casing - to be sealed. 6" casing 575' from 10 or 12 feet above bottom of 8" casing - to be sealed

Constituents	Parts per Million	Constituents	Parts per Million
Total Solids	3472.	Magnesium (Mg)	122.5
Dissolved Solids	-	Iron (Fe) (unfiltered)	9.0
Insoluble Matter	22.	Manganese (Mn)	0.18
pH	7.0	Aluminum (Al)	-
Alkalinity (MeO)	228.0	Fluorine (F)	1.0
Alkalinity (Phn)	-	Chlorine (Cl)	58.0
R_2O_3	7.0	Sulphate (SO_4)	2037.3
Nitrogen as Ammonia (NH_4)	-	Bicarbonate (HCO_3)	278.2
Nitrogen as Nitrite (NO_2)	-	Phosphate (PO_4)	-
Nitrogen as Nitrate (NO_3)	0.0	Borate (BO_3)	-
Alkalies as Sodium (Na)	311.2	Calculated Hardness	1716.
Calcium (Ca)	575	Hardness Grains per U. S. Gallon	100.3

Temperature: Water 59° F. Air 60° F. Measured at 6:20 P.M. 100 ft. from pump after water had passed through 100' of 3" pipe

Remarks

Analysis by State Water Analysis Laboratory, Prof. J. J. Hinman, Jr., Director
Iowa City, Iowa. Lab. No. 132,822. Date May 18, 1939
Sent to:
Date:

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

Name of Well: Melbourne City Well Survey No. W-0908

Drilled by: McCutcheon Well Co. Date: December 1938-May 1939

Total depth: 1340 ft. Curb Elevation: 1050 ft., Static Level: ft.

Casing Data:

Pump and Screen Data:

Pumping Test: Hours Min: Gal.per Min. : drawdown ft.in min.

Description of Formations

No.	Rock Unit	Thick	From	To
	PLEISTOCENE SYSTEM			
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with occasional gray bands between 20'-40'	65	0	65
2.	Drift, gray, coarse sandy, calcareous, micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional fragments igneous material (actually reworked Pennsylvanian shale)	10	160	170
4.	Drift, gray, non-calcareous, igneous material uncommon except in lower 5'	10	170	180
	PENNSYLVANIAN SYSTEM			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite	30	180	210
	MISSISSIPPIAN SYSTEM			
	Meremec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite; occasional bands of hard gray limestone	5	210	215
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11	215	226
8.	Dolomite, light buff to brown, fine crystalline, with occasional traces of chert, and with thin bands medium to coarse sandstone between 235'-240' and 250'-255'	34	226	260
	Osage Series			
	Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60% brown to gray chert. Authigenic quartz common between 270' and 275'. Driller's log shows 4 streaks green shale at 270'	24	260	284

Notes:

Melbourne City Well Generalized Log

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
10.	Shale, medium gray, unctuous, soft, non-calcareous	3	284	287
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	13	287	300
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grading to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with hard bands from 293' to 307')	7	300	307
13.	Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica, and chert in lower 10'	23	307	330
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
	KInderhook Series			
	Hampton Formation			
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	16	370	386
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine crystalline, non-oolitic, translucent	19	386	405
17.	Dolomite, grey, fine crystalline, traces pyrite and chert. Rare sand grains	5	405	410
18.	Limestone, gray, fine crystalline to flaky textured	5	410	415
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15	415	430
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	3	430	433
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	17	433	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	30	450	480
23.	Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in upper part)	20	480	500
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2	500	502

Melbourne City Well Generalized Log

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	Maple Mill Formation			
25.	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15'	68	502	570
	DEVONIAN SYSTEM			
	Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	7	570	577
27.	Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide cemented sandstone and thin band light gray fine granular textured cherty dolomite at approximately 600'	56	577	633
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline, translucent; 10% coarse irregular quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine crystalline, fossiliferous, slightly sandy in lower 6 feet	24	666	690
30.	Shale, light greenish gray, calcareous	15	690	705
31.	Dolomite, drab to brown, fine crystalline, translucent with thin band limestone at top	7	705	712
32.	Shale, light gray, calcareous, with occasional thin bands of brown dolomite	63	712	775
	Shell Rock Formation			
33.	Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 800'-805'. Traces of gypsum	40	775	815
34.	Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure	27	815	842
35.	Dolomite, brown, fine granular texture, hard, trace gypsum	8	842	850
36.	Shale or siltstone, light brownish gray, fair shaly structure	5	850	855
	Cedar Valley and Wapsipinicon Formations			
37.	Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum	15	855	870

Melbourne City Well Generalized Log

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
38.	Dolomite, drab gray, coarse crystalline, clastic (?) weak	10	870	880
39.	Dolomite, light buff, coarse crystalline, clastic (?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white limestone with euhedral dolomite crystals between 915'-920'. Trace gypsum	30	900	930
41.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium crystalline, hard, with small percentage interstitial gypsum-	30	935	965
43.	Gypsum, white, massive bedded, in part brown or black	20	965	985
44.	Dolomite, brown to red brown, fine to extemely fine crystalline, hard, vitreous, with small percentages interstitial gypsum in lower part	45	985	1030
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain textured chert and traces gypsum	20	1030	1050
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20% gypsum in lower 30'	49	1050	1099
47.	Shale, light green, silty, fair shaly structure	6	1099	1105
48.	Dolomite, light brown, fine to medium crystalline	5	1105	1110
49.	Shale, light gray, non-calcareous entirely as mud	5	1110	1115
50.	Dolomite, soft, light gray, fine crystalline, weak, porous, with small percentages gypsum. Dolomite drills to mud	30	1115	1145
51.	Gypsum, white, massive bedded	20	1145	1165
52.	Shale, red, dense, and shale green gray, slightly unctuous, sandy (10% medium quartz sand)	10	1165	1175

Melbourne City Well Generalized Log

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
53.	SILURIAN SYSTEM Chert, white, opaque, to buff, translucent, massive bedded, with small percentage red and green shale cave, increase in quantity in lower 15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystalline, very hard, with 10-20% chert, part of which may be cave, and 25% red and green sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystalline, translucent, vitreous, sandy in lower 5'	20	1250	1270
56.	Dolomite, light drab to green, fine crystalline, translucent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	35	1270	1305
	ORDOVICIAN SYSTEM Maquoketa Formation			
57.	Shale, green and chocolate brown interbanded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	Shale, green gray, and brown, soft, and hard, fair shaly structure	15	1325	1340

Jan. 11, 1939.

Jan 11, 1939

Melbourne, Marshall Co:

City Well - Progress report by Mr. Howard R. Green

Top Maple Mill at 507 (Pumping test run)

S.W.L = 117½

Production 11 gpm Drawdown = 200 - 117 = 83' at 11 gpm.

Well cleared after 1 hour then became muddy again showing that upper shales were probably caving.

Well produced 25 gpm for 20 minutes.

90' of limestone.

Well to be cased, drilled through 100'± of Maple Mill and 100'± into underlying ls & dolom.

Forecast

MELBOURNE

Marshall County

Elevations:

Crossing M&StL	1052
Crossing CM&StP	1058.6
Melbourn ?	1031

Two ground water provinces distinguished: 1 The Iowa valley floor including the lower valleys of several of the larger creeks, in which the alluvium only is used 2. The remainder of the county, in which the drift and Kinderhook are used.

(Mr. Russel states there is no alluvium in the valley at Melbourne and the 1st province is therefore ruled out) (??)

At Rhodes and Melbourne shallow wells generally furnish abundant water from drift and alluvium. On all the creek bottoms, however, good flows may be had. Three aquifers re reported at approximately 150, 200, and 250 feet. From the last, which underlies the Des Moines stage, a head of 27 feet above the surface is sometimes obtained. The water is mineral, closely resembling the Colfax water, and may come from the same aquifer, the St. Louis limestone, although this has not been positively identified in this county.

At Melbourne the brick factory well draws it supply from a lens of sandstone in the Des Moines stage at a depth of 230 feet. Other deep wells are in Limestone of the Kinderhook stage at similar depths.

(From rept by Dr. H.G.Hershey to Mr. Howard R. Green)
The best possibilities of obtaining a water supply for Melbourne is from the Upper Kinderhook series. Water from this source would be hard, ~~but would~~ but would be better than that from the Penn. The Lower Kinderhook is made up of Maple Mill shale which is dry and approx. 100' thick. I estimate the top of the Maple Mill at approx. 500' at Melbourne and believe that an adequate water supply can be obtained above that point.

Elevations and thicknesses from the 1938 maps. Sea Level elevations

	Approximately
Top of the Mississippian	~~800'~~ 835
Top of the Maple Mill	~~540'~~ 560
Top of the Devonian	425'
Top of the Galena	-280'
Top of the St. Peter	-740'
Top of the Jordan	-1280'

510' To Top Maple Mill sh
Old Fig. 16

not reached

Thickness:

Base of Maquoketa to Base of Glenwood	460'
Maple Mill	75'
Silurian and Devonian Systems	650'
Galena - Decorah - Platteville	440'
St Peter	53'
Maquoketa	160'

KINDERHOOK SERIES

Hampton Formation

Iowa Falls Lo ~~local district~~ - Entirely of Br. dol. 75'

Eagle City Oolitic Ls
Lith. Ls
Mason Br. dol. (42')
Thin bedded Oolitic Ls
Hrd. br banded ~~x~~ line crinoidal Ls 70'

Maynes Creek 68' Br foss. dol. interbedded with cht. mbr — 50'

Chapin Except. foss. Br. Dol. & Cht (?)
Brown Oolitic Ls (E)
(Lower Portion Esp Near Legrand)
Thickness Varies from 8-45' (in Franklin Co) 45'

240'

Total thickness of Kinderhook (Hampton only)

	Lowden	240'
	Thickness Hampton Traversed	110'
Remaining	" " To be traversed	130'
Thickness of Maple Mill shale		95' (Isopac ~~Struct.~~ Map.)

Depth To top of Maple Mill from Thickness of Members of ~~Hampton~~ Form, 465'

Gen. Log. of Adv. drilling.

Kinderhook	Hampton	Eagle City (about Thru)	Br. gray ~~dol.~~ Ls at Base, dol. in cent. Part	15'
		Maynes Creek – Br. Foss ~~Cht.~~ Dol. with Interbedded Cht.		50'
		Chapin – Brown oolitic Ls		8'-45'
		Maple Mill Sh – Soft Blue to gray, unct. Pyritic Sh.		95'

Structure Contour Maps

		Depth
Top Mississippian System	835'	
Top Maple Mill sh.	560'	490'
Thickness	275'	

Thickness of Kinderhook

Iowa Falls	75'
Eagle City	70'
Maynes Creek	50'
Chapin	45
Thickness	240'

5
35'

Thickness of Ft. Grn. shale & ls. 16'
(Meramec series ?)

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MEMORANDUM

TO: H. G. Hershey

From: H. J. Russell

Subject: Well at Melbourne, Marshall County.

Tentative curb elevation: 1050' A.T.

Drillers log (McCutcheon to Hershey by phone)

Drift	218	0	218	
Lime	52	218	270	Water at 260
Shale	?	270	–	

The top of the limestone is in about the correct position to be the top of the Mississippian since interpolation from the structure contour map gives the top at a depth of 200±. Its probable age is Meramec. There is no evidence to indicate whether its age is St. Genevieve or St. Louis.

The thickness of the limestone (52') is not sufficient to account for all Post-Maple Mill Mississippian beds. On this basis, plus the fact that structure contour maps indicate the top of the Maple Mill at 525' depth, it is concluded that the shale is not Maple Mill in age but rather is a thin shale within the Meramec. Laudon and others

Lime at 218
Water 260
Shale below.

270 52'
18 77
C 5975'

Atkins ⊙

McCutcheon Curb 1050

Top Miss @ 218
Thick — 52'

Elev. 1050±

Top MM 1050 +525
Depth -525' to M.M

4225'
425

Top Miss 1050 +850±

1050
740
1790

indicate that thin shales are to be expected within the upper Mississippian beds.

On the basis of this information it is recommended that drilling continue to the top of the Maple Mill shale at about 530'.

If it is decided to penetrate the Maple Mill and explore lower formations, the following data apply.

	Depth to Top	Thick-ness	Elev. A.T. Top.
Maple Mill	530	95'±	~~+520~~ +560
Devonian	625	600'±	+425
Maquoketa	1225	125±	-200
Galena	1350	440'±	-300
St. Peter	1790	50'±	-740
Jordan	2330		-1280

Provision is hereby made to revise estimates as drilling progresses, particularly when the top of the Maple Mill is reached.

H.R. 12/14/38