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June 7, 1939

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

Dear Mr. Wieters:

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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 Page two.

Mr. A. H. Wieters:

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 agreed with 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 Pepartment 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

John C. Moore Corporation, Rochester, N.Y. Binder and holes in leaves, each Patented 1906. 390345 HOORE'S MODERN Melbourne, Marshall Co. Town Well Meeting at request of H.R. Green who was present with Mr Corbett & two other councilmen Driller reported to have said Maguoketa caving 15' of rock bottom 12-15' now in 8" hole MARSHALL

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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.

John C. Moore Corporation, Rochester, ves, each Patented 1906. Melbourne, (Marshall) - Mr. Frank Becker, Nayor 938. Els, Sec 6, T 824, R 19W Legan Twp. Pre-field Study. Data. Also see crossing clevs. C.G. W. BIEV = 1045 C.M 7 St. P " = 1031 No Major stream near. - No topog map. Geology Wisconsin drift just to W. but not in Malbourne Kansan drift at surface - in topog. maturity Knotor (7) Nobraskan Des Moines series shales & some sandstones. Kinderhook series Thin shaks (Top) Hovy 15. & thin 15. & shaks. (Total 150't Drift on upland 100-200 (Max 400 reported in Go.) Afterian gravels reported 30' thick locally Drift wells form major supply of county Nebraskan too vague & indefinite Well's finished in Des Moines rore. State Conter Aftenian net good producer at state canter Quicksand & mud above shales of Des M. Rhodes & Melbourne chiefly shallow wells Aquiters 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 NEH Sec 5 (TD. 231, Rx 190, SWL-130 Wm. Fort NE14 Sec.1 (TD 258, Rx 205, SW1. - 150 St. Peter 1800'=

Town well at Rhodes 300' in sand 95' thich underlying day Driller E. A. Ford, Marshalltown. Flev. 1011

John C. Moore Corporation, Rochester, N.Y. Binder and holes in leaves, each Patented 1906. 390345 MOORES MODERN Nelbourne (Marshall) Cont Pre-Field study Forcast Assumed clev. of 1040 Elevations Top Bott. Thick Depth 1010 Kansan Aftonian Nebraskan 190 Des Moines 265 4. Kinderhook 570 Maple Mill 690 1000



W/, - NE-SE 1/4- Sec 6 T82N EIgW

John C. Moore Corporation, Rochester, N.Y. Binder and holes in leaves, cach Patented 1906. 390345 MOORES MOOLIN Melbourne (Marshall) Field Investigation Feb. 21, 1938 Numerous shallow wells 40-45' deep (Private) Going dry Schoolhouse Wall John Verwers of Sully - driller 1930 405 ft. T.D. NE 1/4 SE1/4 Sec 6, T82N E19W 5" hole Drilled for 40 gpm. cuncil Meeting WS Cooper. School board at time of drilling FF De Butts RH Filers. H.K Corbett. FA Witt Water of 250 Witt energer Cylinder 2" dia at 280' Blent 520 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 possibilities at Melbourne was on my desk this morning when I^A 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.

water

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. Page #2 Mr. Howard R. Green, Cedar Rapids, Iowa

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 Maile 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 manoubtedly 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

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Sheet No. / Name of Well Melbourne City Well (Morshall Co) Survey No. 4-0908 Location NW14, SW14, SW14, Sec. 6, T 82N, R 19W Date Drilled Analyst Schuldt Curb Elev. 1050' ± 1% 00 Drift, sitt, buff, calc., oxidized, brown spots of org. orig. no pebbles. 10-Drift, sill g sd, buff, exidized, cale. ; sd cont. consid cht. g feld. 9 I.g. mat. 12-10 20non-cale, shightly sandy. Drift, M. gray, firm, silts 30. Dritht. gray to yel. gray, structureless, med. soft, non-cale, with consid. med. to cree az sd & some soft, Nh. texhine met (weath. Feld, or @yp. - soft, with Norm. barings 40_ Drift, sim. to sple. 30-40 47 Drift, H. buff, sdy, with occas. gran. of Ig. mat., i.e. groonstone. sale., oxidized . strongh mod. to .50 55 Drift, H. buff, sdy, exidized, strongly cole., occos. Sm. pebbles, 11g pebble .60-Weath. chert. sim. to sple so - 40 65 Drift, gras, croe, sdy, with gr. of Ig. mat. g.bs. cale, unoxidized, mica 70. 75 Drift. non cale Stronolu 80 8 Drift 11 1 with gr. calc. micac. 90-Drift. -~ a. n 11 Drift, . * * * # A # # # # # # # # # # /00

Sheet No. 2 Name of Well Melbourne City Well Survey No. W-0908 Date Drilled...... Analyst. Schuldt-Location Morshal Co. /00 Drift, gray, micac, cresesdy to gran. Ig. Nat., calc., dense, sim. to sple, 95-100 ~ * 96s, * Drift. " 9 " 11 /10-Drift. 11 * 9 " * * * * , * 10 11 H , + + + H H H + + + , H 11 11 Di-ift " " /20 Drift 11 11 11 11 11 , 11 10 11 " Drift, " 11 11 11 11 11 11 11 11 11 / 30. Drift, gras, sim. to sple 100-105" Drift " " " /40_ Prift. 11 - 11 11 N 4 14 Drift. 4 A 4 11 - 11 " / 50. 11 11 - 11 . 11 Drift, 11 Pritt, + " " - " . some Whig It, buff silty drift. / 60 Drift It. buff, oxidized, leached, with nom. granules q sm. pebbles Ig. Met. Reworked Penn. Drift, buff to drab, leached, occas. 19 trag., nom frag. sh. Reworked Ponn. /70-Drift, gray, noncale., 19. mat. uncommon, num. frag. sh., some blk. sh prtings Rewerked Penn, " common (cave ?), or drift with nam. sh. prtings Drift gray, Pleistocene 180 Reworked Ponn. Shale gray, sim. to sple. 175-180 Pouri shale, gray g H.gray, noncale, no ig. mat / 90 shale, " + " " , " " , " " " Shale, " " " " , " " , " " , " " " 200

Sheet No. 3 Name of Well Melbourne City Well Survey No. W-0908 Location Morshall Co. Date Drilled...... Analyst. Schuldt 200 Shole, H.gray, non cale., no Ig. Mat. +6 drk. grad 205 Shale, med. gray tolt.gray non-calc., soft, with 5% dull to vit. cool, sh. pyritic cool Band 201' (Drillers log) 210 Sh, V. H. gran, homogen, no structs with finely dissen pyrite, 60%; 10% med. graysh 45, Vilt. gray, fine xline, med. soft, strongly calc. 30% 1.1.1 215 45, Vilt.gray, fine xline, mod. soft, strongly cale, e sh, V.H. grn, V. strongly cale, structuraless, homegen; pyrite, 5%. 220 hs, H. butt to H. gray, sim. to sple. 45 20' KINO Sh 225 45, 4. 1 11 , py ritic, 10% Dol, H. drab Stime xline (Text. sim. to Ls. text.), slowly offerv., 80%; KIM, Br. Cht. 230. Doly " ", sun todal sple 225-230', Ifrag. coal (cave). Pyrite 52% 235 Dol, It. butt, br., med to date gray, sandy, del. all time aline, (mothed ?), with 10% pyrite, Sd.gr. med. to crse., crvl., frosted, 10%, gocces. frag. xline Qz. clusters. 240. Dol, It buff, fine xline, with small Qo drk. gray from above. < 3% med. sd (care), Ifrag. grn. sh., Ifrag. Blk. Sh. 245 Dol, sim, to dol. sple 240-245' 4 frog. grn. sh. (Glad. type) 250 Doly br. fine sline test. 93 %; It gray dol. 55., 9 loose sd. 5%; 12% cht. 255 ", Transluscent, with 27. drh br. unct.sh. Dol., br., " " " 260 A D D P P Dol, br, sim, to sple. 250'-200' With 60% br. To gray cht; 3% grn. sh. 2 3 8 8 8 8 8 8 263 20% " cht. 3 % grn sh. 190kh Dol, br, " consid, gray sh. 270. 2% Qz Sd. Auth. AZ 50 % " " " 1 - 1 11 Dolig brig " " commen. 13% pyrite; consid. gray sh. _____ Polybri, finexline, Transl, with gray sh, glfrag. blk. sh; Pyrite 3%; Flints cholcod. q processe an 25% consid. clear xline. dol. 80 sh, med. gray, unct., saft, fair shaly struct, non-calc., 270 Grm. sh with disem. Birite 10% br. dol. g cht. Doly It. gray, fine sline. hird, with much sh. mud, ser frag. hrd. gray dol with inter-consid. cht. q massive az. - Grown cht. 90 Dol, br. to blue, consid. cht 9 ser. frag. drk. sh. Dol; drk br. gray, fine xline, soft; 20% cht. I frag. lim. yel. mic. sh. 00

Sheet No. 4. Name of Well Melbourne City Hell. #1. Survey No. H-0905 Date Drilled Analyst Schuldt Location ... 300 sh, med. gray (actually silt, intext.), with frag. blk. sh., (V. unctuous), 25% br dol. geht.; Ifrag. Lim. yel. ss, comented. Sh, med. gray, soft, V. fine sandy, Qz., non-cale, 209. Cht & massire Qz sor. 1g. frag. glauc., fine kline dol. 305 10-Del, br., fine xline, soft, with 40% shale, med. to drh. gray, 20% cht. Doly br., fine xline, some frag. clauc., with consid. sh. mad q Itrag. blk sh. I frag. Lim. yel. ss., comented. 20-Dol, br. to gray, fine xline, with 40% massive az, opaline silica g cht., Tr. blk. sh Tryellin 55, 55% pyrite.; (15% sh. tr grn sh. Dol, brito gray, fine xline, with I frag. coal, & than 5% armsh; 5300 Pyrite 10% cht. 3 30. Dol, H.gray, fine xline, mod. soft, Ifrag, massive Q2. Dal, " ", " " " " 40_ Dol., " ", " hord I is in " , 2% cht. Dol. " ", 2 th Wh. to transh cht "1 50. Doly " ", " ", " ", 2 % . " Doly " ", " ", hrd, glouconitic in prt. 60 Pol., " ", " " ", " Del, H. gray to drab, fine xline, hrd., tr. glave. dol.; 2 frag. drk. gray sh; I frag It. 3 70. Dol, drab to buff, fine cuhed, xline, porous; 5% cht. ; Tr. Qz gr. Dol., " " " , " perensin prts. 80 Dol., " " " " 11 , fewfrag. . U.S. wholly of fors, frag 4s, It. bath, floury text., colific, 70%; 386 Dol, drab to buff, fine & line, 30% 90 Lis. H. buff, wholly celite with matrix Fine text, to med, x line transl. fass. 19 pyrite 45, H. butt,

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753KA

· Sheet No.	5	Name of Well Melbourne City Well #1. Survey No. W-0908
Location		Date Drilled Analyst Schuldt
400		45, slightly dol., It buff to It. gray, fine xline, transl. ; 1% dear caleite, 1% Iron oxide Tr. cht. 190 proverte
-		Dol, gray, fine xline, hrd, 120 pyrite, 120 cht. pare ed. gri
10		45, groy, finexline, to floky text., with 5 to clear caleite
		Del, gray q It. buff, fine xline, sm. % clear calcite, cht. grare sd.gr., some echitic mot., some Ls.
20-		Dol, sim to sple. 415-120 in comp. 9 constituents
		Dol, gray q It. buft, fine xline Sm. % clear calcite, accas QZ sol. gr., 3% calcite 1% cht
		us, dol., It. bott, , " " " " " " " " " " " " " " " " "
40_		us, It buff to It. gray, V. fine xline, drk spotted in prts., 32 az sa, 2% parte, Tricht
*		4s, " " " ", " " , rdre Gz gr.
50_		hs, a ma my m m y occas, m m
-		Dol, drob gray, time x line, hrd, poreus, With 30% cht., It. gray, occas. sa.gr.
- 60-		Dol, calc., drab gray, fine xline, compoct, hrd.,
		Del, ", " ", " ", " , ", slightly porces in prets, 30% cht.
70_		Del., ", " ", " ", ", ", ", " " " " " 25% Cht "
		Dol, ", " ", " , " , ", " " ", 20% cht
80-		Ls, It. drab gray, fine xline, finely porous; 2% coleite ; 10% wh. weath. cht.
		hs, " ", " ", " ", " " ; 10% Wh. Fresh cht. <u>politic</u> or <u>asagen</u>
90-		45, Brab, ", ", ", Transluscent, Wel, 5% finely dissem pyrite, 5% Colcita.
(700		Del, ", ", ", ", ", ", ", ", ", ", ", ", ",

Sheet No. 6 Name of Well Melbourn City Well #1 Survey No. 0908 Date Drilled...... Analyst....Schuld+ Location 500 ss, med. to crese. losse sol of fine dol. or pyrite com. as aggregates, cres sol. peerly serted, ang. to crel., 22 pyrite; 300. Del. drab, Transl., sim. to spic above 2007. Sh. H.grey, as mad, 5 sh, H. grn. gray, calc. hrd, poor shaly struct. 10 shin a any " . a a sh, * " ", ", ", " . 3% dissem. pyrito 11 11 20 sh, " " ", " , " , " 56, " " ", ", *, " 30 sh, " " ", " , " , " 11 Sh. + + + + + + + 40_ sh, a " ", ", ", " , " Shy is is my the joint of the second " Hashed sple shows 8% H. gray dol; 2% az sd 50_ 5h, w " ", ", ", ", " " " . four frag. dol. sh, " " ", with streaks choc. br., slightly cale; 5 To butt dol. of Ig. mat. (extran.) 60 SD, " " " to H. dive grn, slightly Cale, with occas. frag. dol. q cht. Sh, " " " " " " " " " " " H. graydel. g cht 70. Dol., It. gray, fine xline, porous, with 15% H. gray, blue speckled cht. as frag. 9 dies 5% sin to sm. pebble sized masses of xline QZ, some abraded, (pers. extran. Sm. 2, 51 Dol. H.groy, sim. to sple. 570-575, with sm. 20 sd. 50% Sh, It. gray, slightly cole, 80 sh, H. gray, slightly cale, rare frag. Is q cht. Sh, " " , " " 90 5/1, 11 11 11 . 11, 12, -2, 11, 11 14 sh, "", " ", with 15% med.gr. ang. ss com. with Iron exia

00

heet No	 Name of Well Melbourn City Well #1 Survey No. W-0908
ocation	 Date Drilled Analyst. Schuldt
6 00	 Sh, H. gray, cale, soft, poor shaly struct. 75% Del, H. gray, fine granular, pereus, with It gray, blue modified cht. 15% Sd, med., subano. to crul. with V. crose ang. gr. commany Yellow Iron Oxide trag. Common Sh, H. gray, calc., soft, poor shaly struct. 80%, with 15% sd., 9 10% H. gray del. Pyritic
10-	Sh, H.gray, soft, poor shaly struct, slightly Cale,
20-	Sh, " ", ", ", ", ", ", ", ", ", ", ", ",
	 5h, """, ", " " ", " ", " ",
30_	Sh, ", ", ", ", ", ", ", ".
40_	Del., drab, fine grannular, transl., hrd ; Ifrag, Cht. Ifrag. parita sh, 20th Del sim to dal sale 635-640
	 Dol, " " " " " " - " . consid, driking mad
50_	 Dol, drab, fine xline, Transh, hrd, sim. to dol. sple. 635-640. 5% med. to crose Qz sd, with irreg. surf., Tr. pyrite Dol. drabte crow sim to sple 635-640. 15% med to crose Qz sd. crvl. to subrd. frested.
60-	Dol, , ; 15% ; Tr. py.; 3% red to. axide freq.
70_	43, H. buff, sub xline, sub transh, hrd. 70%. Dol, sim, to dol. spla 635-440', 30%
	 45, H. boff, ", , , , , , , , , , , 5% ii " ".
80-	43, " ", ", ", ", ", ", ", ", 198 + + +. 45, doly, blue gray, fine xline, hrd, 10%
90-	45, 14. bett to gray freexhine, hod, With 15% med. az sd.
	 Sh, " " " " ", " , " 15% " " " (Com. & sd)
00	

ogation	Date Duillad Analyst Scholdt
location	Date Driffed Analyst
700	sh, H.gray to grn gray, slightly cale, entirely as mud
10	Dol., drob to br., time xline, transl., hrd, 70%. 45, 1t. buff, subxline, subtroast., hrd 30 % Dol., sim. to dol. sple 705-710, 50%; 45, sim. to 15. above 20%
	sh, H. gray, cale, entirely as mud : ser. frag. of del. from above
20	
	sh, the gray to gray "," call, entirely as mud.
30	Si, " " " , " " " Occas, frag. del.
	shipe a a a a ja ja a a a a a a a a tras. cht.
40	53, 4 11 11 11 11 11 11 11 11 11 11 1
	Shi w w w w w w w w w w w w
50	Sh, " " .
	55, * " " " , " , " , " , " , " , " , " ,
60	50, """", ", ", ", ", 2% Wh, 5ypseum
	sh, " " ", ", " " . sev. freg. retten Wood, Theyp, sin, Tibrida
70	Sty " " " ", *, with sim to Gray daly 250 Gyp.
	-53, m m m m, m, m,
80	Dol, br., med kline, transl., hrd. Tr. 640, Tr. Py
	Aly i n n h h h h.
90	Del., *, ", ", ", ", 2.5% 3×P.
	Dely ", ", ", ", 258 ", "
	Dat a la la comp



Sheet No. 10 Name of Well. Melbourne City # 1 Survey No. W-0 908

00	Bil Hanny Ulbra along bal all a for the with and the fit
	Vol., 11. gray, Brine xline, Not, flaky tract, With 25 7 11. Or. 201.
	Dol, H. gray & H. br. V. fine Eline, hord, Tr. 940.
10-1	Doly
	Dely a br., " " " ", " ; 25% Wh. Us. with cross cuted, del. xtals,
20	
	Boh, " "," gray " " ", " ; Tratip
	Uel, * * * " , * " , " , 3-420 Exp.
30	
	Pol a " first and the body the to the fill and the of
	out, " , the to meastine, the sin of interstition 23 p., in prove,
40	Del . " " + + + + 2-3? " + + +
	Del. br-drobgery, fine + + + + + + + + + + + + + + +
50	Del, drabgmy, " " " " " " 10% massive ayp
	Bol, bri , " " " " , " , son to interstitial sign
0	
60	Dal, ", " " ", " , 4% " " 9 massire 9.2P.
	Cyp, massive, with some to be del.
70	
	Gyp, a, " " a a " - Gyp, wh, spagge g transh, br, g blk.
	Gyp. II. , II. II. II. II. II. II. II. II.
80	
	Byp. 1 , 4 4 . 4 . 4 . 4 . 4 . 7 . 4 ,
	pet to the state of the state state
	unger, the shae, and, gransh, sup vit., with 25 to massive Eyp.
90	Del la
	any or, , , , , , , , , , , , , , , , , , ,
-	

Sheet No. // Name of Well Melbourne City #1 Survey No. W-0908 Date Drilled...... Analyst. Schuldt Location 1000 Dal, redbr, substine, hrd, vit., Tr. gyp Doly " ", " , " , ", ", Tr. 23P 10 Dol, br., extremely fine xline, prof, compact, with sm. To interstit. 9xp. Doly H. bry fine to extra " " " " " " " " " " " " " " " " 20 Delf a My M M M M M M M 1 " , " , 18% " , massi 30. Dal, H.br., sugary, with 5th - 8% It. gray, pore. Text. cht. ; 32 mossive fyp 70 10 40_ Dol, "both " " , with 1-220 " " + 11 : Th 31P. Delig a magent mar to the mar and the state 50. Dat, drabgray, Fine slive, prd. Dol, 11 11 11 11 11 60-Dol, br., " to mod. xline, hod. Doly ", " " " " , ", Trigge 70. Dol., ", " " " " , " , " " Doly ", " " " " , " , " . 80 Del, ", " " " " , " , 20% EAP Dal, "1 + " " " 1 107. 540 90-Dol, Ha, H, M H H H , 1020 H , Del, "", ", " ", " ", " , 72 " Sh, grn, silty, fair shaly struct, non-cale 15% 17 00

heet No	12 Name of Well Melbourne City #1 Survey No. W-0908
ocation	Date Drilled
// 00	shareen, silty, four shaly struct, non-cale.
	Del, H. br., fine to med. aline, Tr. Gyp.
10	Sh, H. gray, non cale, entirely as mad.
	Del, sett, cr sh, It, gray, fine alme, wook, perous, sue 26 exps. ; del. drills to naud
20	Rob " , " " , " " , " , " , " , " , " , "
	Del, a, e u, " Dett, " ", ", ", " The " ;" " " " " .
30	Dal, ", ", ", ", ", ", ", ", ", ", ", ", ",
	Dol, ", " ", " ", ", ", ", ", ", ", ", ", "
40	Dol, ", " ", " ', " ", ", ", " ", " ", " "
	Espseum, White, massive, 100 %
50	BIP. ", ", ", 90%, 10% det. Hour.
	Gyp, ", ", 1020 soft del, sm. 8. tr. 1. cht.
60	Gyp, ", ", 90, 10% " ", 10% Groy to blk transl. cht.
	- sty ted, dense, g sh, green gray, unit, 80 %; 3% med. sd, 7% tht, 4% dol, 1% syp.
70	sh, red, dense, with 15% sd. 1-2% byp (coved)
	- Cht, wh. opaque To butt transh, Massive, bedded, with 5% red sh, ghrdgin silly sh. 3% com. mod. 3
80	cht, " " " " " , " , " , " , " 15% holted soly sh, 3% ernsh
	Cht, " " " wh " , " " , 2% Grng rd sdy sh
90	Cht, " * " * " , " " , " " , " " " " " " "
	cat, " " " " " " " " Tr. " " " " "
00	

$\begin{array}{c} 1200 \\ 1200 \\ 1200 \\ 12$		DIDWIN Schuldt
	cation	Date Drilled Analyst
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1200	cht, wh, opeaue of Transh measure bedded, toss., with 5th toparn say sh
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Cht, n, " " " , " " , " , " , " , " " " " "
$ \begin{array}{c} $		cht, 11, 11 11 11, 11 11, 11 820 0 11 11 11,
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	20	cht, ", * " ", * ", ", ", " 20% * " " 3% * "
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		
	30	Cht, ", " " ", " ", ", " ", " 202
$ \begin{array}{c} chr.g.del, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	40	Chty del, sim to spletes -1235', dol 60%, Cht 10% , 30% H * " " " " " " 32064 Pyril
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		cht,qdil, """"""""""""""""""""""""""""""""""""
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	50	Cht, godel, " " " " " 558, cht 72 ; " 30 % " " " 5869818
60 06/		Doly H. buff, Fine xline to subxline, transh, W. hrd; 5% green gred shg 1% gyp
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	60	Doly
$ \begin{array}{c} 70 \\ $		Del, Hibult, fine xline " " , " , " , soly, 570 grammat hod sh, 570 Gyp, 57, bilter banda
$Bd_{1} = \frac{1}{2} + \frac{1}{$	70	Del H. drab to gron, fineshine, transl, hord, with 50% Wh, waath cht-
$80 \qquad Del_{1} + \frac{1}{2} +$		- Bol, + + + +, + +, + , + , + 60 % + + +.
90 Del, * " " ", ", ", ", " 70%, " * * 3% " *. Del, " " " , ", ", ", " 30%, 10 % med gr: welleded, treated & asd, 10% gr: alauce Sk. Del, " " " , ", ", ", ", " 40%, 10% * 4 " * ; " * * , " * * , 00000 Glauce gr:	80	Oblan " ", ", ", ", " 6070 " " . 108,274 Sh-occus Blanc grinsh
90 Del, """, "", ", ", ", " 30%, 10 % med gr. Welloded, frested Gasd, 10% grn <u>elave</u> Sk. Del, """, ", ", ", ", " ¥0%, 10% ", " ", " , " , " Blcos <u>Glauce</u> gr		
Dol, " " " , " , ", ", " #0%, 10% " " " " " " I Decos Glauce gr	90	Del, " " " , " , " , " , " 30%, 10 % med ar welleded, frested 62 set, 10% arn slave Sk.
		Del, " " " , " , ", ", ", " \$0%, 10% " " " " , " " " Occos Glaucegr

Sheet No. 14 Name of Well Melbourne City #1 Survey No. W-0908 Location 1300 Dol, grn, finexline, 9 butt, substine, brd, transl, with 5% azgri, with 30% red 9 Ere Sm to say P. sh, green & chec. br. interbanded, micaceous 10with 20% br dol, 45% cht, sm To set Sh, 11 4 11 17 No sple 20 No Sple. Sh, bring gray, soft, as mud, son to cht, dol, 902 ad 30. " ghod, dom. as mud , she to cht, dal, 9 an so - br. , 54 1 11 11 11 14 14 14 11 , 10 11 10 10 10 10 11 " " " Sh, 40_ CHO 50. 60-70. 80 4 90-00

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.

Nam	e of Well: <u>Welbourne City Well</u> Survey	No. W.	- 0908	
Dri	lled by: Marshal County, Logan Twp. Date	11.3 2 2	,	193
Tot Cas	al Depth:ft;Curb Elevation; <u>1050</u> ft;Static ing Data:	Level	l:	ft.
Pum	p and Screen Data:			
Pum	ping Test:HoursMin; Gal. Per Min; Drawdown	ft	. in	
<u>No.</u>	Rock Unit NW4, SW4, SW4, NE4 Sec. 6, T82N, R19W T Contractor McCutcheon Well Co.	hick.	(Feet)	<u>To</u>
2.	PENNSYLVANIAN SYSTEM Des Moines Series		141, 244 142	
1.	Shale, light to dark gray, non calcareous, with thin coal band of 207' and less than 1% pyrite	51	2051	210'
	MISSISSIPPIAN SYSTEM Meremec Series <u>St. Louis Formation</u>			
2.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite, and with occasional bands of hard gray limestone	51	310'	215
	Shale, white (From driller's log)	31	215'	2181
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')	31	218'	2201
4.	Limestone, light buff to light gray, fine crystalline, soft	61	2201	2261
	Kinderhook Series Hampton Formation			
5.	Dolomite, light drab, fine crystalline, with trace of chert	91	2261	2351
6.	Dolomite, light buff to brown, with thin bands of sandstone; sand medium to coarse, curvilinear, frosted, 10%	51	2351	2401
7.	Dolomite, light buff, fine crystalline, with small percentage green shale	10'	340 1	250 *

Notes:

Name	of Well: Melbourne City Well Survey	No. W-	0908	
Dril	Lled by: Date			193
Tota Casi	al Depth:ft;Curb Elevation; <u>1050</u> ft;Station; ing Data:ft;Curb Elevation; <u>1050</u> ft;Station;	C Level	- *	ft.
Pump	and Screen Data:			
Pump	ing Test:HoursMin; Gal. Per Min; Drawdown	ft	in	min.
No.	Rock Unit Description of Formations	hick.	From	To
0	Delemite brown wery fine crystalline texture		(Feet)	
0.	with 5% light gray dolomitic sandstone; trace of chert	51	2501	2551
9.	Dolomite, brown, very fine crystalline, translus- cent	51	2551	2601
10.	Dolomite, brown, very fine crystalline, with 60% brown to gray chert. Authigenic quartz crystals common between 270' and 275' (Driller's log record 4 streaks green shale at 270')	ds 241	2601	2841
11.	Shale, medium gray, unctuous, soft, non-calcareous (Driller's log records 3' gray shale 284 - 287')	⁸ , ₃₁	2841	2871
12.	Dolomite, light gray, fine crystalline, hard, with much shale mud	h 31	2871	2901
13.	Dolomite, brown to blue, with much chert, fine crystalline, soft	10'	2901	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 1	3051
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	*	3051	3071
16.	Dolomite, brown, fine crystalline, soft, with 40% gray shale. Some glauconiferous dolomite	13'	3071	3201

Notes:

Name of Well: Melbourne City Well Survey	No. W-	. 0908	
Drilled by: Date			193
Total Depth:ft;Curb Elevation; 1050' ft;Stati	.c Level	.:	_ft.
Casing Data:		*****	
Pump and Screen Data:			
Pumping Test:HoursMin; Gal. Per Min; Drawdown	nft.	.in	_min.
No. Rock Unit	Thick.	(Feet)	<u>To</u>
17. Dolomite, brown to gray, fine crystalline, with much massive quartz, opaline silica, and chert. Trace of yellow sandstone, pyritic	10*	3201	330'
18. Dolomite, light gray, fine crystalline, moderate- ly soft	51	3301	3351

Name	of Well: Melbourne City Well Surve	ey No. W	0908	
Dril	led by: McCutcheon Well Co. Date Dec.	, 1938-1	May,	193 9
Tota	Depth: 1340 ft:Curb Elevation. 1050 ft.Stat	ic Love	1.	f+
Cari	Data	TO DEVE.	± •	
Casti	ing Data:	****	• • • • • • • • • • • • • •	******

Pump	and Screen Data:			
Pumpi	ng Test:HoursMin; Gal. Per Min; Drawdo	wnft	. in	_min.
	Description of Formations			•.
No.	Rock Unit	Thick.	From	To
	DIFICEOCENE SYSEEN		(reet)	
	Kansan Drift			
1.	Drift, buff, silty, sandy in parts,			
	calcareous, with occasional gray	65	0	LE
2.	Drift, grav, coarse sandy, calcareous,	05	0	05
~ •	micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional			
	reworked Pennsylvanian shale)	10	160	170
4.	Drift, gray, non-calcareous, igneous		100	110
	material uncommon except in lower 5'	10	170	180
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous	,		
	with thin coal band at 207'; trace		7.00	07.0
	MISSISSIPPIAN SYSTEM	30	180	210
	Meremec Series			
,	St. Louis Formation			
0.	calcareous, homogeneous, with much			
	finely disseminated pyrite; occasional			
17	bands of hard gray limestone	5	210	215
1.	crystalline, soft, driller reports			
	white shale 215'-218'	11	215	226
8.	Dolomite, light buff to brown, fine			
	of chert. and with thin bands medium			
	to coarse sandstone between 235-2401			
	and 2501-2551	34	226	260
	Osage Series			
9.	Dolomite, brown, fine crystalline, 60%			
	brown to gray chert. Authigenic			
Notes	quartz common between 270' and 275'.			
	Driller's Log shows 4 streaks green	21	260	281
	pliate au kiu.	n4	200	204

Melbourne City Well Generalized Log Page #2

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; grad- ing to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with	F	200	307
13.		hard bands from 293'-307') Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive guartz, opaline silica, and	7	300	307
		chert in lower 10 ¹	23	307	330
14.		Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
		Hampton Formation			
15.		Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert	16	370	386
16.		Limestone, light buff, highly colitic with floury textured to fine	10	510	200
		crystalline matrix. Lower 5' line	19	386	405
17.		Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	5	405	410
18.		Limestone, gray, fine crystalline to	~	120	175
7.0		flaky textured	5	410	415
19.		crystalline, traces chert and quartz	15	415	430
20.		Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above			
		or below	3	430	433
21.		very fine crystalline, dark mottled	17	433	450
22.		Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in		4	
		upper 10'	30	450	480
23.		crystalline, slightly porous, with 10% oolitic chert (leached in			
		upper part)	20	480	500
24.		English River Formation Sandstone, medium to coarse loose			
		sand and time dotomite or pyrite			
		Dolomite band above or below	2	500	502

Melbourne	City Well Generalized Log Page 3			
Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
25.	Maple Mill Formation Shale, light green gray, calcareous,			
	hard, poor shaly structure, with streaks of olive green and choco- late brown shale in lower 15!	68	502	570
	DEVONIAN SYSTEM Sheffield Formation			
26.	Dolomite, light gray, fine crystalling porous, with 15% blue mottled chert	9, 98 7	570	577
27.	Shale, light gray, soft, slightly calcareous, with thin band medium		510	211
	grained, iron oxide cemented sandsto and thin band light gray fine granu	one lar		
	Lime Creek Formation	56	577	633
28.	Dolomite, drab, fine crystalline, transluscent; 10% coarse irregular	22	622	666
29.	Limestone, light buff, very fine crystalline, fossiliferous, slight-	22	660	000
30.	lý sandy in lower 6 feet Shale, light greenish gray, calcareous	24 5 15	666 690	690 705
21.	crystalline, transluscent with thin band limestone at top	7	705	712
32.	Shale, light gray, calcareous, with occasional thin bands of brown	10	77.0	mme
33.	Shell Rock Formation Dolomite, brown, medium crystalline	60	712	115
	in upper part, medium to fine in lower part with buff band 800'-	10	TATA	01 5
34.	Shale, gray to light green gray, silty, very fine sandy in parts,	40	(1)	012
35.	poor shaly structure Dolomite, brown, fine granular	27	815	842
36.	Shale or siltstone, light brownish gray, fair shaly structure	5	842	855
37.	Cedar Valley and Wapsipinicon Formations Dolomite, brown, fine granular to			
	fine crystalline, with 5-7% gypsum	15	855	870

Melbourne City Well Generalized Log Page #4

Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	(Ft.)
38.	Dolomite, drab gray, coarse	10	\$ 70	000
30	Dolomite, light buff, coarse	TO	070	000
27.	crystalline, clastic(?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white lime- stone 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 cryst- alline, hard, with small			
	percentage interstitial gypsum	30	935	965
43.	Gypsum, white, massive bedded,	20	045	OPE
11	Delemite brown or plack	20	905	900
44•	to extremely fine crystalline, hard, vitreous, with small percentages interstitial	15	0.95	1020
. 45 •	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain	42	1020	1050
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20%	20	1030	1090
	gypsum in lower 30'	49	1050	1099
47.	Shale, light green, silty, fair shaly structure Dolomite light brown fine to	6	1099	1105
40.	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. Dolomi	te		
	drills to mud	30	1115	1145
51. 52.	Gypsum, white, massive bedded Shale, red, dense, and shale green gray, slightly unctuous, sandy	20	1145	1165
	(10% medium quartz sand)	10	1165	1175

Melbourne	e City Well Generalized Log Page #5			
Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	(Et.)
	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, trans- lucent, massive bedded, with small percentage red and green shale			
	15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystallin very hard, with 10-20% chert, part of which may be cave, and 25% red and gree	e,		
	sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystalli transluscent, vitreous, sandy in lower	ne,	1250	1270
56.	Dolomite, light drab to green, fine crystalline, transluscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower	20	12.90	1270
	part	35	1270	1305
	ORDOVICIÁN SYSTEM			
	Maquoketa Formation			
57.	Shale, green and chocolate brown inter-	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: Kelbourne City Tell	Survey N	o. W- <u>0908</u>	
Drilled by: Dete	Dec. 19	NS-May-	,193 0
Total Depth: 110 ft:Curb Elevation: 1050 ft	:Static	Level:	ft.
Coging Data:	,		
Casing Data:		*****	
		-	
Pump and Screen Data:			
Pumping Test:HoursMin; Gal. Per Min; D.	rawdown	ft. in	min.
Description of Formation	S		•
No. Rock Unit	Th	ick. From (Feet)) <u>To</u>
PLEISTOCENE SYSTEM Kansan Drift			
1. Drift, buff, silty, sandy in parts,			
calcareous, with occasional gray	61		65
2. Drift, srav, coarse sandy, calcareou	S.		42
micaceous	95	5 65	1.60
3. Drift, buff, non-calcareous, occasion	nal	·	
Tragments igneous material (actual.	19 30	360	170
A. Drift. grav. non-calcareous. igneous	41	1	7.10
material uncommon except in lower !	51 10	170	180
PENNSYLVANIAN SYSTEM			
Les Moines Mories	TACING .		
with thin coal band at 2071; trace	a survivora y		
pyrite	30) 180	210
MISSISSIPPIAN SYSTEM			
St. Louis Porestion			
6. Shale, very light green, strongly			
calcureous, homogeneous, with much			
finely disseminated pyrite; occasi:	onal	010	27.4
7. Limestone, light gray to buff, fine		a sector	643
crystalline, soft, driller reports			
white shale 215 -218	11	1 215	226
8. Dolomite, light burr to brown, fine			
of chert, and with thin bands media	2) 1310		
to coarse sandstone between 2354-24	01		
and 250*-255*	34	4 226	260
Usage Cerles Terror Formation			
9. Dolomite, brown, fine crystalline, 60	2%		
brown to gray chert. Authigenic			
Notes: quartz common between 270' and 275'			
Driller's log shows 4 streaks greet	21	260	284
surre st side	And	1 100	work.

*

Melbourne City Well Generalized Log Page #2

Rock	Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
10.		Shale, medium gray, unctuous, soft,	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; grad- ing 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 quarts, opaline silica, and	23	307	330
14.		Dolomite, light gray, fine crystalline,	40	330	370
15		Kinderhook Series <u>Hampton Formation</u> Delorite duch to buff, fine subsdral			
15.		crystalline, porous, with 5% chert in upper 5'	16	370	386
16.		with floury textured to fine crystalline matrix. Lower 5' fine		2.44	105
17.		crystalline, non-colitic, translucent Dolomite, gray, fine crystalline, traces	19	386	405
18.		pyrite and chert. Hare sand grains Limestone, gray, fine crystalline to	5	405	410
19.		flaky textured Dolomite, gray and light buff, fine crystalline, traces chert and quartz	2	410	412
20.		sand Shale, dark gray, unctuous, flaky	15	415	430
21.		or below Limestone, light buff to light gray,	3	430	433
22		very fine crystalline, dark mottled in upper part, slightly sandy Delomite, drab gray, fine crystalline.	17	433	450
660		hard, slightly porcus, cherty in upper 10'	30	450	480
23.		crystalline, slightly porous, with 10% colitic chert (leached in		Shere.	
24.		upper part) English River Formation Sandstone, medium to coarse loose	20	480	500
		sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	2	500	502

Melbourne	city wert generalized pog bage 2			
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 choco-			
	late brown shale in lower 15'	68	502	570
	DEVONIAN SYSTEM	and a stand		
	Sheffield Formation			
26.	Dolomite, light gray, fine crystallin	e,		
	porous, with 15% blue mottled chert	CALL AND P		
	and 5% coarse irregular quartz mass	es 7	570	577
27.	Shale, light gray, soft, slightly			
	calcareous, with thin band medium			
	grained, iron oxide cemented sandst	one		
	and thin band light gray fine granu	lar		
	textured cherty dolomite at approxi	mate-		-
	1ý 600 t	56	577	633
	Lise Creek Formation			
28.	Dolomite, drab, fine crystalline,			
	transluscent; 10% coarse irregular	A. A.B. COL		
	quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine	1.1		
	crystalline, fossiliferous, slight-	- 1. J. J. S. M.		
	ly sandy in lower 6 feet	24	666	690
30.	Shale, light greenish gray, calcareou	s 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	10	-	
	uolomite	63	712	115
	Shell Rock Formation			
330	Dolomite, brown, medium crystalline			
	in upper part, mealum to line in			
	lower part with buri band 800'-	10	FIFTE	07 F
21	buy, traces of sypsum	40	115	610
340	chale, gray to light green gray,			
	silty, very line sandy in parts,	20	OTE	010
25	Delette brave fine countles	41	013	04%
22.	bolomice, brown, ille granular	¢	010	OFA
36	Shale on siltstone light knownich	0	oga	050
500	apay. Pate analy standard	5	850	SEE
	Broky roll outly build build		0,0	633
20	Gegar valley and mapsipinicon Formations			
314	Sine arretalline with 5 20	15	QCC	270
	ine crystalline, with 5-7% gypsum	13	033	010

Melbourne City Well Generalized Log Page #4

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	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10 [†] , with 25% white lime- stone with euhedral dolomite	εv	000	900
	crystals between 915'-920'. Traces gypsum	30	900	930
42.	Dolomite, light brown to drab gray, fine to medium cryst- alline, hard, with small		900	133
13	percentage interstitial gypsum	30	935	965
4.2 .	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	1.5	0.05	1020
45.	Dolomite, light brown, sugary in upper 5', very fine crystalline below. 5-8% gray, porcelain	42	989	1030
46.	Dolomite, drab gray, fine to medium crystalline, hard, with 10-20%	20	1030	1050
	gypsum in lower 30'	49	1050	1099
47.	shale, light green, silty, fair shaly structure	6	1099	1105
48.	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 sypsum. Dolomi	te		
	drills to mud	30	1115	1145
51. 52.	Gypsum, white, massive bedded Shale, red, dense, and shale green grav, slightly unctuous, sandy	20	1145	1165
	(10% medium quartz sand)	10	1165	1175

Melbo	ourne City Well Generalized Log Page #5			
Rock	Unit Description of Formation	Thick (Ft.)	From (Ft.)	To (Tt.)
	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, trans- lucent, massive bedded, with small percentage red and green shale			
-	cave, increase in quantity in lower	55	1175	1230
54.	Dolomite, drab gray, very fine crystallin very hard, with 10-20% chert, part of which may be cave, and 25% red and sre	ne,		
	sandy shale	20	1230	1250
55.	Dolomite, light buff, very fine crystall transluscent, vitreous, sandy in lower	ine,	1050	1 0 00
56.	Dolomite, light drab to green, fine crystalline, transluscent, hard, with	20	1200	1210
	occasional glauconite grains in lower			
	ORDOVICIAN SYSTEM	35	1270	1305
57.	Shale, green and chocolate brown inter-			
	banded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	and hard, fair shaly structure	15	1325	1340

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

	Description of Driff Cuttings			
Name	s of Well: Surve	y No. W.	- 0908	
Drii	Led by: Date Date		,	193
Tota	ng Data:	ic Level	L:	ft.
Casi	ing Dava.			
Pump	and Screen Data:			
Pump	ing Test:HoursMin; Gal. Per Min; Drawdow	nft	. in	_ min.
No.	Rock Unit Description of Formations	Thick.	(From (Feet)	To
N.	PLRISTOCHNE SYSTEM			
	Eanoan Drift -			
1.	Drift, buff, silty, sandy in parts, cal- careous, with occasional gray bands between 20'-40'	651	01	65 *
2.	Drift, gray, coarse sandy, calcareous, micaceous	951	651	160*
3.	Drift, buff, non-calcarcous, occasional fragments ignoous material (actually required Fernsylvanian shale)	10*	160*	170*
4.	Drift, gray, non-calcereous, igneous materi uncommon except in lower St	10"	2701	1901
	PERSTINANIAN SYSTER			
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous with thin coal bank at 207"; trace pyr	30t dte	160*	210*
	R'SSISSIPPIAN SZSTEN			
	Neremes Series St. Louis Formation			
6.	Shale, very light green, strongly calcare- ous, homogeneous, with much finely discominated pyrite; cocasional bands			
	of hard gray limestone.	13 e	5704	216*

Notes:

- 2 - -

MELBOURNE CITY WELL

Description of Pormations.

No.	Rock Unit	Thick.	From	To
7.	Limestone, light gray to buff, fine crystalline, soft, driller reports white shale 215'-218'	11,	2151	2261
	Rinderhook 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			
	2351-2401 and 2501-2551	341	226*	2601
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"	241	2601	2841
10.	Shale, medium gray, unctuous, soft, non- calcareous	31	2841	2871
11.	Dolomite, light gray in upper 3', brown and highly cherty in lower 10', fine crystalline	131	287.1	3001
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grad- ing to very fine sandstone with masses of irregular quartz at base. (drillers log shows gray shale with hard bands from 293-307'	78	3001	3071
13.	Dolomite, brown fine crystalline, soft, glauconitic in parts, with much massive quarts, opaline silica, and chert in lower 10'	231	3071	3301
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40*	3301	3701
15.	Dolomite, drab to buff, fine euhedral crystalline, porcus, with 5% chart in upper 5"	16*	5701	3861
16.	Limestone, light buff, highly colitic with floury textured to fine cry- stalline matrix. Lower 5' fine crystalline, non-colitic, trans-	201		
	- ALA COLLA	791	3861	4051

. 3 .

MELBOURNE CITY WELL

Description of Fermations

Nos	Rock Unit	Thick.	From	To
17.	Dolomite, gray, fine crystalline, traces pyrite and chert. Rare sand grains	51	405*	410*
18.	Limestone, gray, fine crystalline to flaky textured	51	410	4151
19.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz sand	15*	415*	4301
20.	Shale, dark gray, unctuous, flaky cleavage; thin band sandstone above or below	S1	4301	4351
21.	Limestone, light buff to light gray, very fine crystalline, dark mottled in upper part, slightly sandy	171	4331	4501
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in upper 10'	301	4501	4801
23.	Limestone, light drab, fine crystalline, slightly porcus, with 10% colitie chert (leached in upper part).	201	4801	5001
	English River Formation			
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite cemented sandstone fragments. Dolomite band above or below	21	500*	5021
	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*	681	5021	5701
	DEVONIAN SYSTEM Sheffield Formation			
26.	Dolomite, light gray, fine crystalline, porous, with 15% blue mottled chert and 5% coarse irregular quartz masses	71	570*	5771

MELBOURNE CITY WELL

- 4

Description of Formations

No.	Rock Unit	Phick.	From	<u>or</u>
27.	Shale, light gray, soft, slightly cal- carecus, with thin band medium grained, iron oxide cemented sand- stone and thin band light gray fine granular textured cherty dolomite at approximately 600'	561	5771	6331
28.	Dolomite, drab, fine crystalline, trans- luscent; 10% coarse irregular quartz masses in lower half	331	6331	666*
29.	Limestone, light buff, very fine cry- stalline, fossiliferous, slightly sandy in lower 6 feet	241	6661	6901
30.	Shale, light greenish gray, calcareous	151	6901	705
31.	Dolomite, drab to brown, fine cry- stalline, transluscent, with thin band limestone at top 1-2 ft.	71	705*	7121
32.	Shale, light gray, calcareous, with oc- casional thin bands of brown dolomite	531	7121	7651

our log of nell sent to: 13. J. Becker, Mayar, melbourne, Ia 13. N. R. Kreen 208-210 Bever Beag. Ceaar Rapies, Ia 13. J. S. ma cutcheon, ma cutcheon mees co., Decommune la. March 2, 19 39 - Joa depth g 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 Melbcurne 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 yoars,

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 cnes 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.

McCutcheon

Page two

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 Ceder 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



HOWARD R. CREEN COMPANY Consulting Engineers

DESIGN, SUPERVISION AND MANAGEMENT OF MUNICIPAL IMPROVEMENTS payementa bewerage water superv investigations and metoats 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

5 gp romin

Dear Dr. Hershey:

Melbourne.

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

Umtereet:

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

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

64 Sheet No.! Name of Well. Melbourne. Cit.x. Well #1. Survey No. W. 0. 908..... Date Drilled Analyst Harris...... Location 500 pyrite cemented 15 + crse. some highly pol 90 Sh gr lam 25 SIHStone siderife ss v.fn + crse. -57. Dol. drb. fnto eme pale bl chal Cht Hersonshi Sh It.grn, lam, visitly calc 10 sh It, grn, poorly lam, visitly cale. hard PXrc ditto 20 ditto dK brn spores (?) ditto 30 40 much dolo cave? 11 sltly grnish gr. sltly cale Sh 50 sh ditto + blkspots brn, lam wh spots, micac, calc +r ditto 60 ditto ditto much dolo cave 70 grn sh s? 40 Dolo, H.gr. med, pos chty 40 cht wh + H.gr. with blk spots 40 py Q+2 sd crse 5% Dol, gr., med, por glauc erse - 5-92 sd. med to Cht. wh mot gradh gr. 200, vesic shas above st 80 sh sitly grnish &r. sitly cale, soft. sitly silty sh stilly graish gr. v. stilly calc, soft unct. lann 90 sh It-med & ditto ss dabra fr 100 ox comented A

600

Location 700 It-med gr. 1 dolo, dull, massive Sh Dolo brn to gri, med. arg Is, crinto H.bff, fn. 10% 10 Dolo ditto 151070 Sh It. - med & dale 35 st fn 5 Sh. It-med gr. dolo dolo as above 16% 20 sh ditta stilly sitte sh ditto Hgrn 30 sh v. dolo ditto ditto 40 50 60 see Schuldt 70 sh, it med fr v sttly dolo nonlam Dolo, V H. bff, med, hard. tr wh gyp + Dolo drito 80 tr gyp apparently veinlets same selenite DI v 11. bff Hbrn + palegr, icise med selenite Dolo ditto 90 - SPa Byp Dola ditta wheal -570 SY.P. 8 00

Location Date Drilled...... Analyst...... S.E. H..... 800 Dalo, It cron bif, cree - med, hard, transl Dolo, brn, dk brn arg sphs, transl. Dolo as above 10%, tr Exp Dolo brn med transl Dolo bit 10% 10 sh med s/t/y graish gr., lam, (-> Dolo, gr. arg. Dolo from above 20 Dolo varg, med pr ED sh ditto sh It med stilly graish gr. dolo, massive 30 sh ditto but irreg lam Sh It med \$1. vdolo 40 Shditto Dolo H.brn, med, silty 30% Dolo It. brn, med, subsacch 54 5% sh It-med grn, lam, dolo stu 50 dolo as above 20% Dolo med brn med por sh gr. 20% 60 Dolo ditto It. gen sh /12 Exp. - 5% Dolo ditto Dolo, 14.6ff, crse, por 70 sh, med grn, dolo 15% _____ Dolo, crm, crse, PY 80 Dolo, pale crm erse wh gyp 1101 stained Dolo ditto 90 Dolo ditto iron stained Dolo 1t. bff crse 15 Dolo, crm, crse, v. show eff. wh gyp 900

Drillers log Melbaum From To 711-7.76 - Blue Shale (maple guild) -80.7 - Hard gray noch 818 - Brown rock (dol 847 - Gray shale 861 Gray shal with dol. Bands 877 Brown dol. Top 8' full of Ogpseum bands 916 "Charty, line, Gray dol 936 939 Soft Bross dol 960 Gray dol. with Expection stands 967 Brown dol 970 Gyypum 991 Chevit, Gyp, g dol. 1024 Dirty brown line boaded with Oil) 1033 Br. hrd dol 1070 Gray dot 1095 Brown Softrald 11.65 Shal gray.

1 Melbourne Feb. 28, 1939.

Map much pro-gress made last Jeacek. Parz eace Kused equipment. dr naan taday was about 870 drilling in brown linestance. no naticeable Change in coaterlevel. Hachett .



The first & fear drap Cance over night Stands Hard a baccor 130. Jet. was 140 Mouday treading 132 (maring) in nacochect 180 Drap eads gradual Daup Cance Very saan ofter hetting sauce rack. no creaces to speak Mary it seems band Frackalaut 1 foor then band of soghe Rich zenethe manding & 5 fur. Friday am.

Date	Received 12/15/38
Name of Well City Well	Well No. W-0908
Town Melbourn, Ia. Cour	ity Marshall
Location NW, SW, SW, NE Sec. 6 T, 82 N, R. 19 W	Logan Twp.
Contractor and Address McCutcheon Well Co., D.	es Moines
Driller Orey Hicks	(-, -) (+ 1.5')
Date Drilled Curb Eleva	ation 1050 (Temp) (110)
No. of Samples 59 No. of Duplicates 59 Yes Log: Condition of Log: (see schuldt)	Condition_ <u>Good</u>
Sample Range: 0-335 additional Sheet	in Der Hershey's Office
Remarks:	
Boxed by: Unkleshay Dec 15 and complete	d by Yoha Jan. 3, 1939.

HOWARD R. GREEN COMPANY Consulting Engineers

> DESIGN, SUPERVISION AND MANAGEMENT OF MUNICIPAL IMPROVEMENTS PAVEMENTS SEMERAGE WATCH 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

By ARbreen

HRG:V

HOWARD R. CREEN COMPANY <u>Consulting Engineers</u>

DESIGN, SUPERVISION AND MANAGEMENT OF MUNICIPAL IMPROVEMENTS PAVENENTS ESWERAGE, WATER SUPPLY INVESTIGATIONS AND REPORTS 208-209-210 BEVER BUILDING CEDAR RAPIDS, IOWA

June 8, 1938

٤

SUBJECT: Melbourne, Iowa

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

Dear Dr. Hershey:

19-18

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

By Maren

HRG:V

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 scon

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

Very truly yours,

H. G. Hershey

HGH:LM Encs.

Wednesday naan taday 810 feet dacan hast to feet has heurseed. rack. Druler Day's Sence stone Tuesday moun. coater had drapped 8 feet. no naticeable difference taday

UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

OFFICIAL BUSINESS



T. W. ROBINSON Iewa Geological Survey Eldg. IOWA CITY, IOWA



Manday '7, 1938 Heer is 290 feer naan today. Jeng thu rack and accassing strike little vien & shall. Hee had 130 faar I coater this maning. Supply comes in slaw. Albert meltame

Feb 1, 1939

Their 678 This lorning. Have have a dark very hard This Pm. have her light gray rock and much softer The coaled like to heav fram you AKlackett Hednesday eve
February 10, 1939

Mr. H. K. Corbett Melbourne, Iowa

17

. . .

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 that 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,

HOH: LM

H. G. Hershey

U.N.

Melbo Fridag P.M.= Have gour three shale and naw about 11 fur in rack at depth \$ 650' The rack is saledand and appears to be Something like Sand stanchur very Kard. appaiently have not his any ather router supply this far. aducie usatance rahar to expect. Hill star Casing Just & wack . HKCarhett

Dec. 7, 1939 .

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9-482 UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID PAYMENT DE POSTAGE \$300

> DEC 7 2 6 FM M 1938 OWA

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

December 1, 1938

Mr. H. K. Corbett Melbourne, Iowa

1

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

Shuck rack at about 200 foat. Have used up all the Casing and naw acourt. ing caring Till adaise you further eaken levark is resum ed. Allanhett Meltaune la Day practically

Show to mr. Rohin Mate separate U.W. Folder

November 28, 1938 Dict. November 26

Mr. H. K. Corbett Nelbourne, 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

1

H. G. Hershey

Frank cards included addressed to Mr. T. W. Robinson, C/ 16.5.

Record coark an collast caednesday. and Cleaned out care un at 80' Acter. Laday. have gove to 100' depth. Stell sarr 7 a gray sler Jadate at abaur 100 feet. ARCarkett Sa

Mr. Robinson

U.W. Nelbourne Marshall Co

March 7, 1939

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

Dear Mr. Green:

I nave 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.

Page two

Green

÷G

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 9RV

HOWARD R. GREEN COMPANY Gonsulting Engineers

DESIGN, SUPERVISION AND MANAGEMENT OF MUNICIPAL IMPROVEMENTS PAVEMENTS, SEWERAGE, WATER SUPPLY 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

lln Bν

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

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.

munderet G

Yours sincerely,

Prank Bicker 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 & Capocities of St. Peter, Vic. of Melbourn Sealevel County Cap. aut Sh PL Town Static Hand 853 Dysart (Ps (973) -120' Tama (60gpm 987 -125 822 Benton Urbana 35 gpm 779 Des Moines Palke 929 -150 44 gpm 872 ± 866 Greenwood Park Desmoires 11

Bulletin #21 At Boone Gread of St. Peter water is 1000' above sea Level at Vinton water from st. Peter nices 38' higher than that from Devonian. (802' Sea Level) at Holstein water from St. Peter more 40' 9 at Orage about 10' above that from higher water beds (Very Roughly 1180) at Waterloo head of water from st. Peter is given at \$65' above sea level

1050

Fown Elex. from Alt. in Iowa

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

Heel depth 930' the Pm nace have 2. Shefts. Denia saled rocksence abacet 850' Waler level remains the Sauce. Driller Seems Sque energed there water is Clace Healt

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

Marshall

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I.US JPWA

1. Eng 1 St Dept

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 sige 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.

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SCHEDULE OF PRODUCTION TEST

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7:00	60	211.0	6.6	
8:00	64	212.0	8.3	
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	
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A copy of the laboratory report of analysis of a one gallon sample of water taken at 0:00 p.m., May 10, is as follows:

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-3-

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, 1939.

n Mr. H.G.Herchey, State Geological Survey, lowa City, lowa. 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 regari 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,

AN Carbett.

Check with Mr. Me. Apr. 7, 1939 Memorandum Subject: Melbourne, Marshall County Well No! [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 attal) Oil show of Casing Record:

218' of 10" W.I cosing from surface to 218' " 8" W.I. "

" 6" W. Steel " " to 1211

Water level & pumping data S.W.L. Bottom of cylinder Depth 138 240 1/6/39 138 521 11 gpm, dd complete 196 + 20' suchon /2 " " " 3/31/39 109 1110 277

Melbourne

Top Dev. 480 570 626± (617,621,640) 2 1196± (1187,1191,1210) Thickness of Dev. Silur. Bottom ... Silur. Top of Mag (sh) V 11.15± (1140-1090) 1305 175 ± (150+200) Thick of Mag (sh) Bottom of Mag 12.90 Top of Galena - 240 1435 1290h = 410 Thick of Gal. Dec. Plat. 440 455 Thick to top Glen Thick of Glenwood - 1745 - 695 1745 Top of St. Peter 1 -2325 Top of Jordan Sheffield bottom 0565 Nevada 205 440 Ames 285 195 250 1056 765 27 N

1090

Melbourne, Marshall Co. Oil reported at 1019' and 1340

started Nov. 11, 1938 with drill 1185 - 1215 30' Light gray lime L"set @ 1211 Light gray lime, green 1215 - 1260 45 shale bands Gray delem. Hard at bettern. 1260 - 1265 5' Sandstone. Nator dropped from 157 to 1265-1297 30 217 Light colored limestone Water raised to 205" 1297 1306 9 1306 - (1340) Grayish brown shale getting more gray with depth. Threads off of all pipe WI 10" surf to 218 653 set of J63 WI 8" 196 1 Wrought Steel 6 630'6 " 570'6" set at 1211' Melbourne 1177 - 1185 fossil) 20' of suction SWL Depth dd complete 240 138 11 gpm Cylender 196 46/39 138 521 1110 3/31/39 147 12 gpm 11 277

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John C Moore Corporation Rochester, N. Y. Binder and holes in leaves, - 4 Patented 1906. 20687 HOURE'S MODERNA Diem Cylinder Longth Stroke 4 3/4 22 " Pram Barral Popth " Cap. moas g Cale 22 " 30 " 49.3 gals. Copec meas by Driller 52 gals

John " Mooro Corporation Rochester, N. Y. Binder and Infes in leaves, - " Patented 1905. 0887 ACCELS TOOLS Nelbourne From Mr. McCutcheon in Atkins Dec 15, 19:8 Drillers Log Gray Orift 205 170 thin sand laters 2 207 2.05 207: Coal Shale 220 of 10 WI GHI Light shit hard bands Ī 215: 35# 2/8 White all 3 Ľ Soft 15 اوداد 2 Brown 15 10 220 JWLEN SS & Is water 10 1 g Brown Is 4 streaks greep Sil 55 & Is water 200 10 30 270 Poured in 273 Fray Sh 3 11 284 / < Gray sh 3 2 87 Brown Is 6 293 14 307 Gray sh hard bands SWL = 160 Brown 15 V35 - 11 17 5 SW47 3 35

IOWA GEOLOGICAL SURVEY Well or Water Sample Data

Bottle No.

TOOLOT				Ε.		1
LOCATION:	Sec	T•	N.,R			Twp
OWNER OF WELL: City	of Melbor	rn		W	ell No	Same in the second
USE OF WATER: City Stock Stock Cooling	upply (x); Pr (); Industri g ();	ivate-Dor ial (); S	nestic (); School Suppl	Public Dr y (); Ai	inking ();] r Conditionin	Live- ng ();
CONSTRUCTION OF WELL:	Drilled (X) Bored ();); Gravel.	-Pack type (); Drive	n (); Dug (); ()
CONTRACTOR: Mc CHT	tcheen		D	ATE DRILL	ED:	
CASING OR CURBING DATA and depth of top an of seals or packers	A: (Show by nd bottom of s, pipe perfo	diagram o each size oration ar	on <u>opposite</u> e of pipe, t nd screens,	side of s he amount etc.)	heet the kind of overlaps,	d, lengti , positi
WELL DATA: Curb Elevation	F1	Present Deptl	11.10'	Final Ft. Depth	-	Ft.
Topographic Positio	on of Well:					
Static Level (Depth	h to Water (1	Below) Cur	·b) <u>138'</u> F	t. Pumpin Level	<u>E 297</u>	Ft.
Amount of Drawdown	297 Ft. pt	mping at	12 g.p.m.	in <u>3</u>	hours	minutes
Calculated gals. pe	er ft. drawdo	wn	g.p.m.			
Capacity of Well	/2 g.p.n	n. at 2	97 ft. dr	awdown.		
mar a R Davis	ylinder		. Pow	er Pr	Thing Big	
Type of Pump	to provide the second state of the second stat	and the state of t	surgers and all appropriate the surgers	statute matter a sustained as	Contraction of the second second second second second second second second second second second second second s	
Depth of Bottom of	Pump 277	ft. v	vith 20	ft. of	suction pipe	
<u>Depth of Bottom of</u> TEMPERATURE: Air	Pump 277 OF.; Water	ft. v 	vith 20 measured af	ft. of	suction pipe	ehrs
<u>Depth of Bottom of</u> TEMPERATURE: Air mins. at	Pump <u>277</u> 	ft. v 	with <u>20</u> measured af n pump after	ft. of ter well water ha	suction pipe had pumped d passed thro	hrs
<u>Depth of Bottom of</u> TEMPERATURE: Air mins. at following pipe	Pump <u>277</u> 	ft. v ^o F., ft. fron	vith <u>20</u> measured af n pump after Time	ft. of ter well water ha (suction pipe had pumped d passed thro A.M.) P.M.)	hrs
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air mins. at following pipe SOURCE OF WATER: Reco	Pump 277 OF.; Water g.p.m.; ent (Type and	ft. v oF., ft. from	vith <u>20</u> measured af n pump after Time	ft. of ter well water ha (suction pipe had pumped d passed thro A.M.) P.M.)	hrs
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air mins. at following pipe SOURCE OF WATER: Reco Glacial Formations	Pump <u>277</u> OF.; Water _ g.p.m.; ent (Type and (Type)	ft. v oF., ft. from d Depth)	vith <u>20</u> measured af n pump after Time	ft. of ter well water ha ((suction pipe had pumped d passed thro A.M.) P.M.)	hrs bugh the
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air 	Pump 2.7.7 OF.; Water g.p.m.; ent (Type and (Type)	ft. v OF., ft. from	vith <u>20</u> measured af n pump after <u>Time</u>	ft. of ter well water ha ((suction pipe had pumped d passed thro A.M.) P.M.) ft. to	hrs bugh the ft.
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air 	Pump <u>277</u> OF.; Water g.p.m.; ent (Type and (Type)	ft. v OF., ft. from	vith <u>20</u> measured af n pump after <u>Time</u>	ft. of ter well water ha (((suction pipe had pumped d passed thro A.M.) P.M.) ft. to ft. to	e. hrs bugh the ft. ft.
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air 	Pump 2.7 OF.; Water	ft. v °F., ft. from 1 Depth)	vith <u>20</u> measured af n pump after <u>Time</u>	ft. of ter well water ha (((suction pipe had pumped d passed thro A.M.) P.M.) ft. to ft. to	e. hrs bugh the ft. ft. ft.
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air mins. at following pipe SOURCE OF WATER: Reco Glacial Formations Limestone or Dolomite (Age) Sandstone (Age) Principal Producing REMARKS.	Pump OF.; Water g.p.m.; ent (Type and (Type) g Formation	ft. v oF., ft. from	vith <u>20</u> measured af n pump after <u>Time</u>	_ ft. of ter well water ha ((at(suction pipe had pumped d passed thro A.M.) P.M.) ft. to ft. to ft. to	e. hrs bugh the ft. ft. ft.
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air 	Pump OF.; Water g.p.m.; ent (Type and (Type) g Formation	ft. v oF., ft. from d Depth)	vith <u>20</u> measured af n pump after <u>Time</u>	_ ft. of ter well water ha ((at(suction pipe had pumped d passed thro A.M.) P.M.) ft. to ft. to ft. to	e. hrs bugh the ft. ft. ft.
<u>Depth of Bottom of</u> <u>Depth of Bottom of</u> TEMPERATURE: Air 	Pump OF.; Water g.p.m.; ent (Type and (Type) g Formation	ft. v oF., _ft. from i Depth)	vith <u>20</u> measured af n pump after <u>Time</u>	_ ft. of ter well water ha ((at(suction pipe had pumped d passed thro A.M.) P.M.) ft. to ft. to ft. to	e. hrs bugh the ft. ft. ft.

Parase Production and a series of and stand to be the 100000 the states the states Rumped. 3hrs. Friday stapped 5:00 Water level 297' at 129pm - (Static level 138!) dropped repidly (so min) pumping about 30 gpm. Sple taken & O'clack. Tues: Morning (water level 147 - No tools in hole - water braught up with Bailer HELDING STAT iksino on ournaid ikin. (Stab by disgrate on oligesibe field of short the bind. length and debt of top and botton of each size of pape, the theolet of overlaps, peritien of soils of pasters, pipe patricities and streams, ats.) Top Maquoteta 1095 internets in internets inte AT AN ANT A STORY ropositive lighted of light of seven (seven) and the light of seven (light of seven) in the light of seven (light of seven (light of seven)) DDX Cased To-653 - i server to receive the method to the energy and shine pay the Atmidian and the board will be To 218 marcheners and marcheners to energing marchine (2012, 20 internet). 10 " 8" To 653 (Top 198') Believes water came from 230-240'-Not Tested ate departed because but notes andle game move all generates to southe 6-1-97-SOURCE OF MATTRE Rooms (Type and Depth) of tail (age) of tailing Principal Producing Formation .() sleying variant (); Sariant into ino main of the

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 Eilurian 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 <u>Level</u>	Pumping Water <u>Level</u>	Drawaown	Production in Gallons per <u>Minute</u>	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,

HGH:L础

H. G. Hershey

TOWA GEOLOGICAL SURVEY Preliminary Generalized Log

W.C.5 Mar. 1, 1939

MELBOURNE CITY WELL

Marshall County, Logan Twp.

NW1, SW1, SW1, NE1, Sec. 6, T.82N., R.19W.

Contractor McCutchenn Well Co.

Curb Elevation 1050'

W-0908

No.	Description	Thick	From	To
	PLEISTOCENE SYSTEM Kansan Drift			
1.	Drift, buff, silty, sandy in parts, calcareous, with o occasional gray bands between 20'-40'	65 '	0	65'
2.	Drift, gray, coarse sandy, calcereous, 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'

N -0908 W-0905

- Junimary

Generalized Log

MELBOURNE GITY WELL

WW, SW, SW, NE, Sec. 6, T. 82N., R.19W. Marchell County, Logan Twp. Contractor McCutcheon Well Co. -Curb-Elevation 1050'-YY Sple. No. Description Thick From To PERNSYLVANTAN SYSTEM Des Moines Series 5. Shale, light to dark gray, non-calcareous, with thin coal band at 207'; trace pyrite 30' 210' 180' MISSISSIPPIAN SYSTEM Meremec Series St. Louis Formation Shale, very light green, strongly calcareous, homogeneous, 6. with much finely disseminated pyrite; occasional bands of hard gray limestone. Driller reports white shale 215-27 51 2151 210' 21 2151 218' Shale, white, (from drillers log) 3.2 11 215 Limestone, light gray to buff, fine grystalline, soft, Driller reports white shale 215'-218 21 226' 7. Kindanbook Sonies-Hampton Formation Dolomite, light buff to brown, fine crystalline, with 8. occasional traces of chert, and with thin bands medium to coarse sandstone between 235-240' and 250'-341 226* 2601 2551 Osage Series Warsaw Formation Dolomite, brown, fine crystalline, 60% brown to gray 9. chert. Authigenic quartz common between 270' and 275' 24' Drillers log shows 4 streaks green shale at 270' 260' 284' 31 284 2871 Shale, medium gray, unctuous, soft, non-calcareous 10. Dolomite, light gray in upper 3', brown and highly cherty 11. in lower 10', fine crystalline 13' 2871 3001 Siltstone, gray, (shaly in character), with bands of brown 12. dolomite; grading to very fine sandstone with masses of irregular quartz at base. (drillers log shows gray shale with hard bands from 293-307' 17 1 3001 3071 Dolomite, brown fine crystalline, soft, glauconitic in parts, 13. with much massive quartz, opaline silica, and chert in 231 307* laver 10' 330' Dolomite, light gray, fine crystalline, glauconitic in lower 14. 401 330' 370" 15' Bolomite, drab to buff, fine

The

Snle.				W-0908
<u></u>	Kinder hout so Description .	Thick	From	То
15,	Hampton Formation Dolomite, drab to buff, fine subedrel crystalline, porous, with 5% chert in upper 5'	16'	370'	3861
16	Limestone, light buff, highly colitic with floury textured to fine crystalline matrix. Lower	101	3861	4051
	5. THE Crystalline, non-colling, transluscent,	19	500	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'
<u>8</u> 1.	Limestone, light buff to light gray, very fine cryst- alline, dark mottled in upper part, slightly candy	17'	4 33'	450*
82	Dolomite, drab gray, fine crystalline, herd, 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'
2 m - 14 m	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'
N 28.	Maple Mill Formation			
25	Shale, light green gray, calcareous, hard, poor shaly structure, with streaks of olive green and choco- late 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 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	561	57771	
28.	bime Creek Formation Dolomite, drab, fine cyystelline, transluscent; 10%	50	577	035
	COUPSe irregular quarts masses in lower half	33'	033*	000'
295.	Limestone, light buff, very fine crystalline, fossilif- erous, slightly sandy in lower half 6 feet	24'	666'	690'
30'.	Shale, light graenish gray, calcareous	15'	690'	705 '
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2/28/39

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No.	Description	Thick	From	<u> </u>
31.	Dolomite, drab to brown, fine crystalline, transluscent, with thin band limestone at top	71	705	712'
32.	Shale, light gray, calcareous, with occasional thin bands	s 63	712'	775
33.	Shell Kock Formation Dolomite, brown, medium crystalline in upper part, med- ium 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 siltatone, light brownish gray, fair shaly structure Cedar Valley & Wapsipinicon Formations	5'	850'	855'
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 cryst lline, clastic (?) week	20'	880'	9001
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white ligestone 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 cryst- alline, hard, with small percentage interstitial gypsum	30'	935'	965'
43.	Cypsum, 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	451	985'	1030'
45.	Dolomite, light brown, sugary in upper 5', isry fine crystalline below. 5-8% gray, porcelain textured chert from and traces cypsum	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	51	1110'	1115'

W 0908

		Thick_	From	To
50.	Dolomite, soft, dr-shaley light gray, fine crystalline, wesk, porous, with small percentages gypseum. Dolomite drills to mud	30'	1115'	1145'
51.	Gypsum, white, massive bedded	201	1145'	1165'
52.	Shale, red, dense, and shale green gray, slightly unctuou sendy (10% medium quartz sand)	⁸ , 10'	1165'	1175'
53.	Chert, white, opaque, to buff, transluscent, massive bedd with small percentage red and green shale cave, incr in quantity in lower 15'	ed, eas- 55'	1175'	1230'
54.	drab gray Dolomite, 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, dight drab to green, fine crystalline, trans- luscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower part	351	1270'	1305'
57.	Maguateta formation 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'

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W-0908

Generalized Log

MELBOURNE CITY WELL Marshal County, Logan Twp.

 $NW_{4}^{1}, SW_{4}^{1}, SW_{4}^{1}, NE_{4}^{1}$ Sec. 6, T. 82N., R 19W.

Contractor McCutcheon Well Co.

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SPLE.				
NO.	Description	Thick	From	To
	PENNSYLVANIAN SYSTEM DESMOINES SERIES			
1.	Shale, light to dark gray, non calcareous, with	5'	205 '	210'
	MISSISSIPPIAN SYSTEM MEREMEC SERIES St. Concyleuse Formalion (7)			
2.	Shale, very light green, strongly calcareous, homogeneous, with much finely disseminated pyrite, and with occastonal bands of hard gray limestone Shale, white, (Fromedrillers log) <u>St. Louis Formation</u>	5' 3'	210' چرچ -	215' - 2 18'
3.	Limestone, very light gray, fine crystalline, sof with 5% very light green, soft, calcareous si (Driller's log shows 3'white shale to 218' on upper 2'	hale	21 8''	226 220 '
4.	-Limostone, light buff to light gray, fine cyystal -soft,	line, 		
	KINDERHOOK SERIES Hampton Formation			
5.	Dolomite, light drab, fine crystalline, with trace chert	90 ef 91	226'	235 '
6.	Dolomite, light buff to brown, eandy-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 - Glonwood Type	1 10'	240*	250'
8.	Dolomite, brown, very fine crystalline texture, with 5% dight gray dolomitic sandstone; trace of chert	9 5'	250 '	255'
9.	Dolomite, brown, very fine chrystalline, translus cent	- 5'	255'	260'
-10-	Dolomite, brown, very fine crystalline, Sith 60%			

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	<u>Attak</u>	From	<u> </u>
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 strocks from shale 24		
	at 270')	260'	28ø'
11.	Shale, medium gray, unctuous, soft, non-calcareous 3' (Driller's log records 3' gray shale 284-287')5'	28Å	7 285'
12.	Dolomite, light gray, fine crystalline, hard, with 3' much shale mud	28,5	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 (Drillars log records gray shale with hard bands from 293' to 807' 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 consider- able massive quartz and chert.	305	307 346'
16.	Dolomite, brown, fine crystalline, soft, with 40% gray shale. Some glauconiferous dolomite	3271	320'
17.	Dolomite, brown to gray, fine crystalline, with m 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 colitic with floury textured to fine crystalline matrix 14'	386'	4001
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 textured5'	410'	415'
25.	Dolomite, gray and light buff, fine crystalline, traces chert and quartz send 15'	415'	430*
26.	Shale, dark gray, unctuous, flaky cleavage, with thin band of sandstone above or below 3'	. 430'	433'

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W-0908

		Thick	From	То
27.	Limestone, light buff to light gray, very fine crystalline, dark mottled in parts in upper			
	5'. Occasional quartz grains	17'	433'	450 '
2 8.	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 crystallin	θ,		
01	in upper 5'	10'	480'	490'
31.	Limstone, drab, fine crystalline, transluscent, with small percentage pyrite some colitic cher	t 10 '	490'	500"
32.	English River Formation Sandstone, medium to coarse loose sond and fine de dolomite or parite cemented sandstone fragment With band drab dolomite above or below	s. 2'	5001	502'
33.	Maple Mill Formation Shale, light green gray, calcareous, hard, poor sha structure. With streaks of olive green and	ly	1. 1 . 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	
	DEVONIAN SYSTEM	68*	5021	570'
34.	Dolomite, light gray, fine crystalline, porous, wit 15% light gray, blue speckled chert and 5% of very coarse irregular quartz sand grains	h 7'	570'	577 '
35.	Shale, light gray, slightly calcareous,	23'	5 7 7 •	6001
36.	Sandstone, medium grained, angular, red and cement- ed with iron oxide in upper part.	1'	600 '	601'
37.	Dolomite, light gray, fine granular texture, porous with light gray, blue mottled chert	' 1'	60 1'	602 '
38.	Shale, light gray, calcareous, soft, poor shaly structure	33'	6021	633 '
39.	Dolomite, drab, fine granular texture, transluscent	, 17'	6331	650'
40.	Dolomite, drab, fine crystelline, transluscent, har with 10% medium to coarse irregular quartz san grains	d d 16'	650'	665'
41.	Limestone, light buff, subcrystalline, subtranslusc hard, fossiliferous	ent, 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, entire as well mud	ly 15'	690 '	705 •
44.	Limestone, light buff, subcrystalline, subtranslusc	entl'	705'	706'
45 _•	Dolomite, Grab to brown, fine crystalline, translus cent, hard	- 6'	706'	712'

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

46.

Dolomites

Tray shale her an 1095 gray until 1168' - There red to 1195. depth the evening abour 60m Dreecer says the red is the real maquakala shale guinny very sticky

Alcarkett Michande

115 TD 11 below Milwadkee Melbourn 130 state 160± @ 7 gpm Verwers Driller Nov. Rock 200' Sh. #+ 130-140 200' of 5" 4" below 260' Pumps down under heavy pumping 4" casing



Acto Slace to lay Chacer 1197-1197 Have allo his succe band g. green heer nor an yet. Depth this coming 1205 feet. stiel in line stane or ' Dolumete. Hochange in state Alcohett mechanica

Besund dreeling. Monday P.M. Cased to 1210 feet. Mouday eos 1222 /2 feet and hitting small streps of shale. helt dueler said nathing to father. - Lecesday -1240 feet at 69M Drules thinks the Shale may be Coming dacan Sede of casing as it is Wat sealed as yet. 2 full shifts every day. Holalett

Thursday J.M. Water drapped abaut 60'over note. nacd abour 215' daran Was just our to cover and it Seems we are in sand. Very hard to bail any thuy aur hur avater Present depeter 12.70' Feel mare 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

N.R. Sreen V By

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Enc.

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

Name	of Well: Melbourne City Well Surve	y No. W.	. 0908	
Dril	Led by: McCutcheon Well Co. Date Dec.	1938-1	lay.	193 9
Tota	1 Depth: 1340 ft:Curb Elevation: 1050 ft:Stat	ic Leve	1:	ft.
Casi	ng Data:	10 1010	the of the second second	
Oabri	ing Dava.			
Pump	and Screen Data:			
Pumpi	ng Test:HoursMin; Gal. Per Min; Drawdow	mft	. in	min.
	Description of Formations		1.4.4	
No.	Rock Unit	Thick.	From	To
			(Feet)	
	PLEISTOCENE SYSTEM			
-	Kansan Drift			
7.	colcorrous, with occasional grav			
	bands between 201-401	65	0	65
2.	Drift, gray, coarse sandy, calcareous,			
-	micaceous	95	65	160
3.	fragments isneous material (actually			
	reworked Pennsylvanian shale)	10	160	. 170
4.	Drift, gray, non-calcareous, igneous		Lange a	
	material uncommon except in lower 5'	10	170	180
	Des Moines Series			
5.	Shale, light to dark gray, non-calcareous,			
-	with thin coal band at 207"; trace			
	UTSSTSSTDDTAN SYSTEM	30	180	210
	Meremec Series			
	St. Louis Formation			
6.	Shale, very light green, strongly			
	finely disseminated pyrite: occasional			
	bands of hard gray limestone	5	210	215
7.	Limestone, light gray to buff, fine			
	crystalline, soft, driller reports	11	27.6	206
8.	Dolomite. light buff to brown. fine		613	220
	crystalline, with occasional traces			
	of chert, and with thin bands medium			
	and 2501 2551	21	206	240
	Asage Series	24	220	200
	Warsaw Formation			
9.	Dolomite, brown, fine crystalline, 60%			
	brown to gray chert. Authigenic			
Notes	Drilleris log shows / streeks green			
	shale at 2701	24	260	284
				and the second se

		mint olr	From	To
Rock Unit	Description of Formation	(Ft.)	(Ft.)	(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; grad- ing to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale with			
10	hard bands from 2931-3071)	7	300	307
13.	glauconitic in parts, with much massive quartz, opaline silica, and			
1	chert in lower 10'	23	307	330
14.	Dolomite, light gray, fine crystalline, glauconitic in lower 15'	40	330	370
	Hampton Formation			
15.	crystalline, porous, with 5% chert in upper 5'	16	370	386
16.	Limestone, light buff, highly colitic with floury textured to fine			
	crystalline, non-oolitic, translucent	19	386	405
17.	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	15	415	430
20.	Shale, dark gray, unctuous, flaky cleavage: thin band sandstone above		4-2	1-
21.	or below Limestone, light buff to light gray,	3	430	433
	very fine crystalline, dark mottled in upper part, slightly sandy	17	433	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porcus, cherty in	30	450	480
23.	Limestone, light drab, fine crystalline, slightly porous, with		420	400
	upper part) English River Formation	20	480	500
24.	Sandstone, medium to coarse loose sand and fine dolomite or pyrite			
•	Dolomite band above or below	2	500	502

Melbourne	City Well Generalized Log Page 3			
Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
	Maple Mill Formation	((*)
25.	Shale, light green gray, calcareous,			
	hard, poor shalv structure, with			
	streaks of olive green and choco-			
and the second	late brown shale in lower 15!	68	502	570
	DEVONIAN SYSTEM	and the second		
	Sheffield Formation			
26.	Dolomite, light gray, fine crystallin	e.		
	porous, with 15% blue mottled chert			
	and 5% coarse irregular quartz mass	es 7	570	577
27.	Shale, light grav, soft, slightly			
~	calcareous, with thin band medium			
	grained, iron oxide cemented sandst	one		
	and thin band light grav fine granu	lar		
	textured cherty dolomite at approxi	mate-		
	1 6001	56	577	633
	Line Creek Formation			
28.	Dolomite, drab, fine crystalline.			
~~.	transluscent: 10% coarse irregular			
	anortz messas in lower helf	33	633	666
20.	Limestone light huff very fine	"	922	000
~7.	ervetalling fossiliferous slight-			
	ly sendy in lower & feet	21	666	600
30	Shale, light graenich gray paleareau	e 15	600	705
27	Delemite duch to brown fine	0 1)	090	105
21.	porchalling translangent with this			
	band limestone at ter	17	705	010
20	Chula light grow aclassons with	'	105	126
260	onare, itshi gray, carcareous, with			
	delegite	63	77.0	MME
	Chall Bask Basestian	63	175	115
22	Diell Rock Formation			
330	Dolomite, orown, medium crystalline			
	in upper part, mealum to line in			
	lower part with buil band 800'-	10	TITLE	OTE
~ 1	805. Traces of gypsum	40	115	912
34.	Shale, gray to light green gray,			
	slity, very line sandy in parts,		42.0	
	poor shaly structure	21	815	842
35.	Dolomite, brown, fine granular		410	
	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		State 1	
	fine crystalline, with 5-7% gypsum	15	855	870
		A CONTRACTOR OF A CONTRACTOR OFTA CONTRACTOR O		

Melbourne	City	Well	Generalized	Log	Page	#1
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Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	(Ft.
38.	Dolomite, drab gray, coarse	10	870	880
30	Dolomite, light buff, coarse	10	010	000
37.	crystalline, clastic(?) weak	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white lime- stone with euhedral dolomite			
	Traces gypsum	30	900	930
47.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium cryst- alline, 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			2000
45.	gypsum in lower part Dolomite, light brown, sugary in upper 5', very fine crystalline	45	985	1030
46.	below. Job gray, porcelain textured chert and traces gypsum Dolomite, drab gray, fine to medium	20	1030	1050
	crystalline, hard, with 10-20% gypsum in lower 30'	49	1050	1099
47.	Shale, Light green, Silty, Tair	6	1099	1105
19.	Dolomite, light brown, fine to			
400	medium crystalline	5	1105	1110
49.	Shale, light gray, non-calcareous, entirely as mud	5	1110	1115
50.	Dolemite, soft, light gray, fine crystalline, weak, porous, with small percentages gypsum. Dolomi	te		1
	drills to mud	30	1115	1145
51. 52.	Gypsum, white, massive bedded Shale, red, dense, and shale green	20	1145	1165
The second	(10% medium quartz sand)	10	1165	1175

Melbourne	City Well Generalized Log Page #5			
Rock Unit	Description of Formation The (1	hick Ft.)	From (Ft.)	To (Et.)
1. m.	SILURIAN SYSTEM			
53.	Chert, white, opaque, to buff, trans- lucent, massive bedded, with small percentage red and green shale			
	cave, increase in quantity in lower	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	20	1220	1250
55.	Dolomite, light buff, very fine crystalline transluscent, vitreous, sandy in lower	,	1200	1290
56.	5: Dolomite, light drab to green, fine crystalline, transluscent, hard, with 40-60% white weathered chert and occasional glauconite grains in lower	20	1250	1270
	DART ORDOVICIAN SYSTEM	35	1270	1305
57.	Shale, green and chocolate brown inter-			
	banded, micaceous	10	1305	1315
58.	No sample	10	1315	1325
59.	and hard, fair shaly structure	15	1325	1340

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

Name o	of Well:	Mell	ourne	e City	WellCU	NL I		Survey	No. W-0908	
Drille	ed by:	McCut	cheon	Well	Co.	Date:	Decen	nber 193	8-May 1939	
Total	Depth:	1340	ft.	Curb	Elevation:	1050	ft.	Static	Level:	ft.
Casing	g Data:									

Pump and Screen Data:

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

Description of Formations

No. Rock Unit

No.	Rock Unit	Thick	From	To
	PLEISTOCENE SYSTEM Kansan Drift			
L.	Drift, buff, silty, sandy in parts,	4		
	bands between 20'-40'	65	0	65
	Drift, gray, coarse sandy, calcareous, micaceous	95	65	160
3.	Drift, buff, non-calcareous, occasional			
	reworked Pennsylvanian shale)	10	160	170
ŧ.	Drift, gray, non-calcareous, igneous	: 10	170	180
	PENNSYLVANIAN SYSTEM	10	TIO	100
5	Des Moines Series			
•	with thin coal band at 207'; trace			
	pyrite MISSISSIPPIAN SYSTEM	30	180	210
	Meremec Zeries			
5	St. Louis Formation			
	calcareous, homogeneous, with much			
	finely disseminated pyrite; occasional bands of hard grav limestone	5	210	215
7.	Limestone, light gray to buff, fine			~
	crystalline, soft, driller reports white shale 215'-218'	11	215	226
3.	Dolomite, light buff to brown, fine			
	crystalline, with occasional traces of chert. and with thin bands medium			
	to coarse sandstone between 235'-240'	77.4	000	0.00
	Osage Series	34	226	260
	Warsaw Formation			
	brown to gray chert. Authigenic			
	quartz common between 270' and 275'.			
	shale at 270'	24	260	284

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Rock Unit	Description of Formation Thic (Ft	k 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 1	3 287	300
12.	Siltstone, gray, (shaly in character), with bands of brown dolomite; grad- ing to very fine sandstone with masses of irregular quartz at base. (Driller's log shows gray shale wit	h	
13.	hard bands from 293'-307') Dolomite, brown, fine crystalline, soft, glauconitic in parts, with much massive quartz, opaline silica	7 300	307
14.	and chert in lower 10 ¹ 2 Dolomite, light grav, fine crystalline	3 307	330
	glauconitic in lower 15' 4 Kinderhook Series Hampton Formation	Ó 330	370
15.	Dolomite, drab to buff, fine euhedral crystalline, porous, with 5% chert in upper 5'	6 370	386
16.	Limestone, light buff, highly oolitic with floury textured to fine crystalline matrix. Lower 5' fine		
17.	crystalline, non-colitic, trans- lucent l Dolomite, gray, fine crystalline,	9 386	405
18.	grains Limestone grew fine crystalline to	5 405	410
19.	flaky textured Dolomite, gray and light buff, fine	5 410	415
	crystalline, traces chert and quart sand	z 5 415	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	T 477	450
22.	Dolomite, drab gray, fine crystalline, hard, slightly porous, cherty in	7 435	450
23.	upper 10' 3 Limestone, light drab, fine crystalline, slightly porous, with 10% oolitic chert (leached in	0 450	480
24.	upper part) 2 English River Formation Sandstone, medium to coarse loose	0 480	500
	cemented sandstone fragments. Dolomite band above or below	2 500	502

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Rock Unit	Description of Formation	Thick	From	To (Ft)
	Maple Mill Formation	(10.)	(200)	(1.0*)
25.	Shale, light green gray, calcare	ous.		
	hard, poor shalv structure. w	ith		
	streaks of olive green and ch	000-		
	late brown shale in lower 15'	68	502	570
DE	EVONIAN SYSTEM		-	
	Sheffield Formation			
26.	Dolomite, light gray, fine cryst	alline.		
	porous, with 15/ blue mottled	chert		
	and 5% coarse irregular quart	z		
	masses	7	570	577
,27.	Shale, light gray, soft, slightly	У	·	
	calcareous, with thin band me	dium		
	grained, iron oxide cemented	sand-		
	stone and thin band light gra;	y fine		
	granular textured cherty dolo	mite		•
	at approximately 600'	56	577	633
	Lime Creek Formation			
28.	Dolomite, drab, fine crystalline	,		
	translucent;: 10% coarse irre	gular		
_	quartz masses in lower half	33	633	666
29.	Limestone, light buff, very fine			
	crystalline, fossiliferous,			
	slightly sandy in lower 6 feet	t 24	666	690
30.	Shale, light greenish gray, calc	ar-		
	eous	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, w	with		,
	occasional thin bands of brown	n		
	dolomite	63	712	775
0 0	Shell Rock Formation	-		
JJ .	Dolomite, brown, medium crystall:	ine		
	in upper part, medium to fine	in		
	lower part with built band 800	- 40		01 5
71	Sub. Fraces of gypsum	40	.1.12	812
04.	Shale, gray to light green gray,	L _		
	silty, very line sandy in part	us,	07.5	040
75	poor snaly structure	27	812	842
30.	Dolomite, brown, line granular		040	050
76	texture, naro, trace gypsum		842	850
00.	onare or strestone, tight prownis	211	050	OFF
	Gray, Latt Shary Strucuture	D	890	000
317	Delemite brown fine menulan to	mations		
01.	fine organizion with 5-rd	. ر		
	TTIG CLASCATTTIC MTCH 0-10	16	055	070
	Cypour	τÜ	000	070

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Rock Unit	Description of Formation	Thick (Ft.)	From (Ft.)	To (Ft.)
38.	Dolomite, drab gray, coarse drystalline, clastic (?) weak	10	870	880
39.	Dolomite, light buff, coarse	20	880	900
40.	Dolomite, light gray, very fine crystalline, hard, brown in lower 10', with 25% white lime- stone with euhedral dolomite			
	Traces gypsum	30	900	930
41.	No sample	5	930	935
42.	Dolomite, light brown to drab gray, fine to medium crystall- ine, hard, with small percent-			
43.	age interstitial gypsum Gypsum, white, massive bedded,	30	935	965
	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			
46.	textured chert and traces gypsum Dolomite, drab gray, fine to medium	1 20 1	1030	1050
	crystalline, hard, with 10-20%	4.0	1050	1000
A 17	gypsum in lower 30'	49	1020	T033
47.	shely structure	6	1099	1105
48.	Dolomite, light brown, fine to	Ŭ	2000	
200	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. Dolo-			
	mite drills to mud	30	1115	1145
51. 52.	Gypsum, white, massive bedded Shale, red, dense, and shale green gray. slightly unctuous. sandy	ະບ	1140-	1102
	(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 a green shale cave, increase	l; ind in		
	quantity in lower 15'	55	1175	1230
54.	Dolomite, drab gray, very fine crystalline, very hard, wit 10-20% chert, part of which) h 1 may		
	be cave, and 25% red and gr	reen		
	sandy shale	20	1230	1250
55.	Dolomite, light buff, very fin crystalline, translucent,	10		
EC	vitreous, sandy in lower 5'	20	1250	1270
20.	fine crystalline, transluce hard, with 40-60% white wea	nt, thered		
	grains in lower part	35	1270	1305
	ORDOVICIAN SYSTEM	00	TNIO	1000
	Maguoketa Formation			
57.	Shale, green and chocolate bro	Wn		
	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

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May 16, 1939

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

Dear Mr. McCutcheon:

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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 18 progressing and that you will soon be at home again.

Very truly yours,

H. G. Hershey

HGH:LM

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

In Cooperatio	m with U. S. Geologica	al Survey	W-0908
Location:	RECORD OF WELL		
Town: MELbour	(N E) VE (S W);Co	ounty MARshall	
NW-SW-SW-NE	_ sec. <u>6</u> T. <u>az</u> N.,R.	19 W. Logan Twp.	-+
Well name and number	Melbourne City	Vell #1	L
Owner		Address	
Tenant		Address	
Contractor McCut.	chean Well Co.	Address Des M	laines
Drillers	Hicks	(HOWERD	GREEN, Engineer
Drilling dates	2ct. 25, 1938 - M.	ay 8, 1939	
Well data: Elevations: Drillin	g ourb <u>1050</u> fe	et; Land surface	foet
Determined by Topographic positi Total depth: Report	onfe edfe	eet, Measured	<u>1340</u> feet
Drilling method	cable trol		
Hole and pering date	0-40' outside si	teel lines) 16" dea	·
position of seals	(Give amount, size, - cemented. 44	, kind, and depth of a	all casing; type and
position of seals gravel pack, open	(Give amount, size, - <u>cemented</u> 44 and packers; cementing <u>of 6</u> <u>canon</u> from hole, etc.)	kind, and depth of a 57 of g" capacity 5; how finishedperf 20 654 to 1212	all casing; type and for a ted pipe, screen,
position of seals gravel pack, open <u>6" open hale</u>	(Give amount, size, - cemented. 44 and packers; cementing of 6" caung from hole, etc.) 1212 - 1340 -above	, kind, and depth of a 57 of 8" capura g; how finishedperf 20 654'to 1212	all casing; type and pipe, screen,
Original depth to wate Criginal elevation of	(Give amount, size, - <u>cernented</u> . 44 and packers; cementing of <u>6</u> <u>caung</u> from hole, etc.) <u>1212</u> - <u>1346</u> r <u>201.1</u> ft. below f water level	kind, and depth of a 57 of grand 57 of gra	all casing; type and brated pipe, screen,
Original depth to wate Qriginal elevation o	(Give amount, size, - cemented. 44 and packers; cementing of 6 cauge from hole, etc.) /2/2 -/346 r_201.1 ft. below f water level	kind, and depth of a 57 of 8" canon g; how finishedperf 20 654'to 12/2 Date ft.; Source of data	all casing; type and provide the pipe, screen.
Original depth to water Sources of water: P	(Give amount, size, - cemented. 42 and packers; cementing of 6" can from hole, etc.) /2/2 -/340 rft. below f water level rincipal <u>Silurian</u>	kind, and depth of a 57 of g" capung g; how finishedperfy 20 654'to /2/2 Date ft.; Source of data /297-/340; Othe	all casing; type and for a terms of the pipe, screen,

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Production data:		Date	Lacy 10 11. 12.	1939
Static depth to wa	ater 201.9	Measuring p	point	Production of the second second second
Pumping level	206.9	at	g.p.m.	and the second
	211.7		2	
	219.0	93		
		and the second s	and the second second	
Specific capacity	<u>7.1 + g</u> .p.r	m. per ft. drawdow	m; Temperature.	<u>59</u> °F.
Pump data; Type pur	np	Column Dia.	Length	1 <u>.</u>
Cylinder or bowls:	Dia	Length	Suction pipe	
Power		Airline		
Estimated rate of	production:	men en el la companya de la companya de la companya de la companya de la companya de la companya de la company	g.p.m. for	hrs. a day
Use of water				
and the second	WATER ANALYS	ES (in parts per m	nillion)	11.2.2.9.4× 11.5.5
Date sampled	May 19,1939	July 18, 1949		Summer and Commercial
Sampled by	W.C. Schuldt	aw Lane		
Total solids	3472	4330		
Insoluble matter		46		
Alkalinity (Meo)	228.0	220		
Alkalinity (Phn)	0.0			
pH	7.0	25/49 7.35		
Fe203+ Mn203+Al203	7.0	27		
Alkali as sodium	311.2	635.9	· ·····	
Calcium		476.3		
Magnesium	122.5	113.1		
Iron (unfiltered)	9.0	6.75		and and the state
Manganese	0.18	0		
Nitrate	0.0	0		and the second second second second
Fluoride				
Chloride	58.0 (170		
Sulfate	2037.3	2499		
Bicarbonate	278.2	268.4	-	
Hardness (ppm)	1716	1667		
Hardness (gpg)		91.3		
Remarks				
Laboratory data:		Sampi	le storage locatio	n
Sample range	No	. spls	No. dupls. &	cond
Spls. prepared by	Vaho Wa	shed range	by	
Driller's log and	cond. Yes	Ctudied	by C+++	n 10g
Lisotuble residue	was rrepared by	Happistrin log	Schulelt Corre	100 TOB
Gen. log	Villes yenseime	Correl, by	n canse	
0011. 108			California and a state of the s	terrapier encourage in the second second second

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WATER LEVEL DATA

Measuring point _____

Date Depth to water Altitude Remarks 4 . REMARKS Rumping test at top Maple Mill-507' SWL= 11712 11gpm with 83'd.d. Oil show reported at 1019' and 1.340' .

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 coment 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 sige 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 Maguoketa 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.

(Tenes	6 9 W	Water	Specific	Romo ni ra
May 10	4766 6 01 6	WE U CA	VEDERARY	ANGARCIA LLO
12:31 n.m.		801.9	-	Static
12:36	42	205.3	12.3	
1:45	42	205.3	12.3	5430 P.
2:09	42	205.1	12.6	
2:41	40	205.6	10.5	570 p.
3:00	48	306.6	10.5	* • * •
3:30	50	206.9	10.0	
4:00	54	207.2	10.3	58 ⁰ 7.
4:30	54	207.7	9.3	
8:00	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	599 F.
7:30	50	207.5	9.0	eyl. gadgets weering
8:30	37	205.9	9.5	N N O
9:00	26	204.2	11.2	16 fs ()
9:30	24	204.8	8.2	stonned to remain cyl.
May 11			an di succes di Aliantia di Successione	
12:10 a.m.	0	201.9		started test again
12:15	<u>58</u>	206.4	11.6	_
2:55	43	206.2	9.9	
3:30	60	806.6	9.8	
4:30	41	207.1	8.4	
5:00	58	209.1	8.0	
5:30	54	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	60	211.6	7.1	
10400	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.
1:50 p.m.	69	212.7	6.4	
2:00	69	212.7	6.4	
3:00	60	211.3	6.4	

SCHEDULE OF PRODUCTION TEST

-2-

		Water	speciiic	
Time	G.P.M.	level	Capacity	Romarka
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	68	212.1	6.2	
0:30	63	818.3	8.1	
10:30	63	213.2	6.1	
11:30	63	212.2	6.1	
11:35	74	214.5	6.0	
11:38	74	215.5	5.4	
11:45	95	218.7	5.7	
11:80	95	219.0	5.6	Stop test
	Recovery Obe	ervations		
11:51	0	214.0	**	
11:52	Ó	210		
11:53	0	807		
11:54	0	308	•	
11:55	0	204.0	•	
12:00	0	205.0	-	
May 12				•
12:10 c.m.	0	202.0	46	•
1				

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

24-	aror. WHarAara	vabore				
County: Marshall	Date	Sampled: May 1	0, 1939			
Town: Melbourne	Samp	led by: W. C. S	chuldt			
Location of Well: NW2, SW2	,3W},NE}, Soc	. 6, T. 82 N., R	19 W.			
Logan Typ.			•			
Owner: City of Melbourne	Well No	. L T.D. 1,340	ſt.			
Type of well: Drilled	Static Level:	201'-11" Curb	elevation: 1050 ft.			
Producing Formation: Silu	rian Dep	th 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 3" casing -						
Constituents	Parts per Million	Constituents	Parts per Million			
Total Solids	3472.	Magnesium (Mg)	122.5			
Dissolved Solids	-	Iron (Fe) (unf	iltored) 9.0			
Insoluble Matter	22.	Manganose (Mn)	0.18			
рН	7.0	Aluminum (Al)	•			
Alkalinity (MeO)	228.0	Fluorine (F)	1.0			
Alkalinity (Phn)	•	Chlorine (Cl)	58.0			
R ₂ 03	7.0	Sulphate (SC ₄)	2037.3			
Nitrogen as Ammonia (HH_4)	-	Bicarbonate (H	co ₃) 278-2			
Nitrogen as Nitrite (MO_2)	-	Phosphate (PO $_4$) -			
Nitroge n as Nitrate (NO ₃)	0.0	Borate (B03)	-			
Alkalies as Sodiwn (Na)	311.2	Calculated Har	dnoss 1716.			
Calcium (Ca)	575	per U. S. Gall	on 100 .3			
Mamana huma 1 Makan EDD M	Adm COD 12	Maanumai ah ci00	D M 100 04 0000			

Temperature: Water 59° F. Adr 60° F. Measured at 6:20 P.M. 100 ft. from pump after water had passed through 100' of 5" pipe

Remarks

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

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

Name (of Well: Melbourne City Well	Survey	No. W-O	908
Drill	ed by: McCutcheon Well Co. Date: Dece	mber 1938	-May 19	39
Total	depth: 1340 ft. Curb Elevation: 1050 ft.,	static	Level:	ft.
Casin	g Data:			
Pump a	and Scroen Data:			
Pumpin	ng Test: Hours Min: Gal.per Min. ;	drawdown	ft.	in min.
	Description of Formations			
No.	Rock Unit	Thick	From	To
	PLEISTOCENE SYSTEM Kansen Drift			
1.	Drift, buff, silty, sandy in parts,			
2.	bands between 20'-40' Drift. grav. coarse sanay. calcareous.	65	0	65
3.	micecous Drift buff non-celearcous	95	65	160
	fragments igneous material (actually	10	160	100
4.	Drift, gray, non-calcareous, ignoous	10	170	180
	PENNSYLVANIAN SYSTEM Deg Moineg Series	ΣŲ	TIO	TOA
5.	Shele, light to dark gray, non-calcareou	18,		
	pyrite MISTSSTPTAN SYSTEM	30	180	210
	Noromoc Series St. Louis Formation			
6.	Shalo, very light groen, strongly			
	finely disseminated pyrite; occasione	1 5	910	-107 H
7.	Linestone, light gray to buff, fine	U		ųly
8.	white shale 215'-218' Dolowite, light buff to brown fine	11	215	226
U ‡	crystalling, with occasional traces			
	to coarse sandstone between 235'-240'	31	00g	960
	Osage Series Wangow Powertion	u-z	ary	AVV
9.	Dolomite, brown, fine crystalline, 60%			
·	guartz common between 270' and 275'.			
	shale at 270'	24	260	284

	-6-		• •
•			•
			•
Melbourne Cit	ty Well Generalized Log	•	•
-		• • •	
Rock Unit	Description of Formation This	ck from	To
	(Ft.	.) (Ft.)	(Ft.)
10.	Shale, medium gray, unctuous, soft,		
	non-calcaroous	3 284	287
11.	Dolomite. light gray in upper 3'.		
	brown and highly charty in lower		
	101, fine crystelline	3 287	500
12.	Siltatone, man. (shelt in obsweater).		~~~
ala Ga 🧶	with honde of brown delewite and		
	the to move fine conditions with		
	ing to very line ashuatone with		
	messes of irregular quarts at base.	L.	
	(Priller's log snows gray shale with	n The state	
	hard bands from 293' to 307')	7 300	307
13.	Dolomite, brown, fine crystalline,		
	soft, glauconitic in parts, with		
	much massive quertz, opaline silica,	3	
	and chort in lover 10 2	3 307	330
14.	Dolomite, light gray. fine erystalline.	•	
	slauconitic in lower 15' 4	0 330	370
เป็นปก	phook Series	• •••	
17 Am	nton Romation		
15.	Dolowite, drah to buff. fine subsdral		
4V1	ownetalling namous with 6% showt		
	drystalling, gorous, wroll o/ didro	e @70	204
16		0 070	000
70e	Linestone, Light buil, nighly colluic		
•	with floury textured to rine		
	crystalline matriz. Lower 5' fine		
	orystalline, non-oolitic, trans-		
-	lucent	9 386	405
17.	Dolomite, gray, fine crystalline, trac	98	
	pyrite and chort. Raro sand grains	5 405	410
18.	Limestone, gray, fine crystelline to		
	flaky textured	5 410	415
19.	Dolomite. gray and light buff. fine	-	
···· - ··	crystalline. traces chert and quart	2	
	anns I	6 415	430
20-	Shala, david aver, unothous, flaky	•	
4V#	elevere this hand condetene above		
	Creeve a for a contra participation ano an	R 430	A 17 17
03	- OF DELOW	y 400	490
61. ·	Lamestone, light buil to light gray,		
	very fine crystalline, dark mottled	·	
	in upper part, slightly sandy 1	7 433	450
2E .	Dolomito, drab gray, fine crystalline,		
	hard, slightly porous, chorty in		
	upper 10' 30	0 450	480
23.	Limestone, light drab, fine		
	crystalline, slightly porous, with		
	10% colitic chert (leached in		
	upper part) 2	0 480	500
Ensi	lish Alver Formation	- 244	े के स े ही
24.	Sendstone, medium to coarge loose		
a en 1481 ∰	and and fine delemite on somethe		
	amantal sandatare two mosts		
	Delevition active opens on permitte		EAD
	-ATAUTA NOTIC CONAS OL NATOR	u 040	e va

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Rock Unit Description of Formation Thick (Ft.) From To (Ft.) 25. Shale, light freen gray, calegroous, hard, poor shally structure, with streaks of olive green and chocolate be brown abele in lower 15' 68 502 570 26. DevowIAN SYSTEM Sheffield Formation 502 570 26. DevowIAN SYSTEM Sheffield Formation 502 570 26. DevowIAN SYSTEM Sheffield Formation 500 577 27. Shale, light gray, soft, slightly guarts masses 7 570 577 27. Shale, light gray, soft, slightly calearoous, with thin band medum grained, iron oxide commeted sand-stome and thin bend light gray fine granular textured charty dolomite 577 633 28. Dolomite, drab, fine crystalline, translucent; 100 coarse irregular 633 666 29. Limestone, light buff, very fine crystalline, forestliferous, slight-crystalline, forestliferous, slight-crystalline, forestliferous, slight-crystalline, forestliferous, slight-crystalline, forestliferous, slight-crystalline, forestliferous, slight method boown dolomite 633 666 30. Shale, light green gray, cal-crystalline, translucent with thin band boo'-dolomite, gray to light green gray, cal-crystalline, forestliferous, with cocasional thin band 600'-dolomite 63	Melbourne City	Well Generalized Log	• ••	•
 Maple Sill Formation 25. Shale, light green gray, caleareous, hard, poor shaly structure, with streaks of olive green and choose late brown shale in lower 15' 68 502 570 DEVONTAN SYSTEM 26. Dolomite, light gray, fine crystall- line, porong, with 15% blue mottled chort and 5% course irregular quartz messes 27. Shale, light gray, soft, slightly calcareous, with thin bend medium grained, irron oxide comented send- stone and thin bend light gray fine granular textured cherty dolomite at approximation 28. Dolomite, drab, fine crystalline, translouent; 10% course irregular quartz masses in lower half 23. Dolomite, drab, fine crystalline, translouent; 10% course irregular quarts masses in lower half 25. Shale, light greenish gray, cal- erroous 26. Shale, light creation 27. Shale, light creation 28. Dolomite, drab, fine 29. Lime stone, light buff, very fine crystalline, to schliferous, slight- ly stady in lower 6 feet 24. 666 690 25. Shale, light creation 26. Shale, light creation 27. Shale, light creation 28. Shale, light creation 29. Shale, light creation 29. Shale, light creation 20. Shale, light creation 21. Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 600'- 005'. Traces of gypsum 29. Shale, light green gray, slity, very fine sandy in parts, poor shaly structure 29. Shale, gray to light green gray, slity, very fine sandy in parts, poor shaly structure 27. Shale or siltstone, light foromish gray, fair shaly structure 28. Shale, gray to light green gray, slity, very fine sandy in parts, poor shaly structure 36. Shale or siltstone, light foromish gray, fair shaly structure 37. Dolomite, brown, fine granular texture, hard, structure 38. Shale or siltstone, light foromish gray, fair shaly structure 39. Shale or siltstone, l	Rock Unit	Description of Formation Thick (Pt.)	From (Pt.)	To (Ft.)
 25. Shale, light green gray, caleareous, hard, poor shaly structure, with streaks of olive green and chocolate brown shale in lower 15' 68 508 570 DEVOBLAN SUSTEE 26. Shaffleld Formation 27. Shale, light gray, fine crystall-line, porous with 155 blue mottled chort and 55 coarse irregular quarts masses on a thin bend light gray fine granular textured charty dolomite at approximately 600' 55 577 633 28. Dolowite, drab, fine crystalline, translowed in lower half 53 603 666 29. Line Creek Formation 105 coarse irregular quarts masses in lower half 53 603 666 29. Line stone, light buff, very fine crystalline, transloenty 105 coarse irregular quarts masses in lower half 53 607 705 30. Shale, light buff, very fine crystalline, transloenty 105 coarse irregular quarts masses in lower half 53 607 705 31. Dolomite, drab to brown, fine crystalline, transluent vith thin bend likestone at top 7 705 712 32. Shale, light cry, calcarsous, with occasional thin bands of brown dolomite 53. The light cryst and the band so forwn dolomite, brown, fine crystalline, transluent vith thin bend likestone at top 7 705 712 33. Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff bend 800'- 005'. Traces of gypaum 40 775 815 34. Shale, gray to light green gray, slits field forwards of shale structure at a fight forwards of gray. Shale shale to siltstone, light forwards at a shale structure at a shale structure for a shale structure for a shale structure for a shale structure for a shale structure for a shale structure forwards forwar		Maple Mill Formation	•	
hard, poor shaly structure, with streaks of olive green and choco- late brown shale in lower 15' 68 502 570 DEVOWIAN SYSTEM Sheffield Formation 26. Tolomite, light gray, fine crystall- line, poroug, with 155 blue motified chort and 5% coarse irregular quartz masses 27. Shnic, light gray, soft, slightly calcarcoue, with thin band medium grainlar textured charty dolomite at approximately 600' 56 577 633 28. Dolomite, drab, fine crystalline, translucent; 10% coarse irregular quartz masses in lower half 55 657 653 29. Line Creek Formation crystalline, fifth gray, cal- carcous 31. Dolomite, drab, translucent with thin band, light gray, cal- carcous 32. Shale, light gray, cal- carcous 33. Dolomite, brown, medium crystalline tume translucent thin bands of brown dolomite free, crystalline in upper part, medium to fine in lower art with buff berd dolomite, brown, sudum crystalline in upper part, medium to fine in lower art with buff berd 34. Shale, light gray, calcareous, with occasional thin bands of brown dolomite brown, fine gray, and 35. Dolomite, brown, fine gray, align dolomite, brown, fine sin lower part with buff band 800'- 105'. Traces of gypsum 40 775 815 36. Shale, sray to light green gray, silty, very fine sandy in parts, poor shaly structure 55. Dolomite, brown, fine gray, align dolomite, brown, fine gray, align for the shaly structure 5 36. Shale, sray to light green gray, silty, very fine sandy in parts, poor shaly structure 5 36. Shale or siltstone, light forownish gray, fair shaly structure 5 36. Shale or siltstone, light forownish gray, fair shaly structure 5 37. Dolomite, brown, fine gray and 555 670	25.	Shale, light green gray, calcareous,		
streaks of olive green and choco- late brown shele in lower 15' 66 502 570 DEVONIAN SYSTEM Shaffield Formation 26. Dolomite, light gray, fine crystell- line, porous, with 15% blue mottled chort and 5% coarse irregular quarts masses 7 570 577 27. Shale, light gray, soft, slightly calcarcous, with thin band medium grained, iron oxide comented sand- stone and thin bend light gray fine granular textured cherty dolomite at approximately 600' 56 577 633 Lime Greek Formation 28. Dolomite, drab, fine crystalline, tranularis masses in lower half 25 633 666 99. Lime stone, light buff, very fine crystalline,forstilferous, slight- ly sandy in lower 6 feet 24 666 690 30. Shale, light buff, very fine crystalline, fressilferous, slight- ly sandy in lower 6 feet 24 666 690 31. Colomite, drab to brown, fine crystalline, trenslucent with thin band limestone at top 7 705 712 32. Shale, light gray, calcarcous, with occasional thin bends of brown dolomite 65 712 775 Shell Fook Formation 33. Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff peres gray, silty, very fine sandy in parts, poor shaly structure 27 815 642 35. Dolomite, brown, fine gray, al- do the brown, fine gray, al- do the boown, medium crystalline in upper part, medium to fine in lower part with buff bend 800'- do the the fine sandy in parts, solty, very fine sandy in parts, poor shaly structure 27 815 642 36. Shale or siltstone, light prownish gray, fair shaly structure 5 850 855 37. Dolomite, brown, fine granular texture, hard, trace gray m 8 342 850 36. Shale or siltstone, light prownish gray, fair shaly structure 5 850 855 37. Dolomite, brown, fine granular to fine crystalline, with 5-78 graysun 15 855 870	,	hard, poor shaly structure, with		
Inter provention in the provention of		streaks of olive green and choco-	600	ENO
Bevonian System 36. Delomite, light gray, fine crystall- line, porous, with 15% blue mottled chort and 5% coarse irregular quartz masses 7 570 577 27. Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide comented sand- stone and thin band light gray fine granular textured charty dolomite at approximately 600' 56 577 633 28. Dolomite, drab, fine crystalline, translucent; lo% coarse irregular quartz masses in lower half 53 666 690 29. Lime Greek Formation Dolomite, drab, fine crystalline, translucent; lo% coarse irregular quartz masses in lower half 53 666 690 30. Shale, light persitiline, for translucent; lo% coarse irregular quarts masses in lower half 53 666 690 31. Dolomite, drab to brown, fine crystalline, translucent; uith thin band limestone at top 7 705 712 32. Shale, light gray, calcareous, with occasional thin bends of brown dolomite 63 712 775 33. Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 600'- UO5'. Traces of gypsum 40 775 815 34. Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure 67 815 842 850		late brown shale in lower 15' 68	508	070
 26. Definition formation has been been been been been been been bee	DEVON	IIAN SYSTEM		
 26. Instance, light l	00	Sherrigia Formation		
 chort and 2', coarse irregular quariz masses 7 570 577 27. Shale, light gray, soft, slightly calcareous, with thin band medium grained, iron oxide comented send- stone and thin bend light gray fine granular textured cherty dolomite at approximately 600' 65 577 633 28. Dolomite, drab, fine crystalline, tranclucent; 10% coarse irregular quariz masses in lower half 25 633 666 29. Lime Greek Forwation errystalline, for crystalline, tranclucent; 10% coarse irregular quariz masses in lower half 25 633 666 29. Limestone, light buff, very fine crystalline, for feet 226 666 690 30. Shale, light greenish gray, cal- careous 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, brown, msdum crystalline in upper part, medium to fine in lower part with buff band 800'- 005'. "races of gypsum 40 775 515 34. Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure 277 815 942 55. Dolomite, brown, fine granular texture, hard, trace gypsum 8 842 850 36. Shale or siltstone, light forownish gray, fair shaly structure 5 850 855 37. Dolomite, brown, fine granular 	80.	Dolomite, light gray, line crystalled		
 control and by control in register 7 570 577 27. Shale, light gray, soft, slightly calcareoue, with thin band medium grained, iron oxide comented send-stone and thin bend light gray fine grained, iron oxide comented send-stone and thin bend light gray fine grained, iron oxide comented send-stone and thin bend light gray fine grained, iron oxide comented send-stone and thin bend light gray fine grained, iron oxide comented send-stone and thin bend light gray fine grained, iron oxide comented send-stone and thin bend light gray fine gray during the stone in lower half 55 633 666 28. Dolowite, drab to biver half 55 666 690 30. Shale, light greenish gray, calcaroous 15 690 705 30. Shale, light gray, calcaroous, with occasional thin bands of brown dolomite frag, calcaroous, with occasional thin bands of brown dolomite in upper part, medium to fine in lower part with buff band 800'-605'. Traces of gypsum 40 775 815 33. Dolomite, brown, fine gray, salty, very fine sandy in parts, poor shaly structure 27 815 942 35. Dolomite, brown, fine gray salty, stucture 5 850 855 36. Shale or siltstone, light preven says 37. Dolomite, brown, fine gray satistore 5 850 855 		chast and St course irregiler		
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 32. Shale, light gray, calcarcous, with occasional thin bands of brown dolomite 53. Shell Kock Formation 53. Dolomite, brown, medium crystalline in upper part, medium to fine in lower part with buff band 800'- 005'. Traces of gypsum 40 775 815 54. Shale, gray to light green gray, silty, very fine sandy in parts, poor shaly structure 27 815 842 55. Dolomite, brown, fine granular texture, hard, trace gypsum 6 842 850 56. Shale or siltstone, light brownish gray, fair shaly structure 5 850 855 57. Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum 15 855 870 		band ligestone at top	705	712
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 33. 33. 33. 33. 34. 35. 35. 35. 36. 37. 37. 37. 37. 36. 36. 37. 37. 37. 37. 36. 36. 37. /ul>		dolomite 63	712	775
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35.Dolomite, brown, fine granular texture, hard, trace gypsum884285036.Shale or siltstone, light brownish gray, fair shaly structure585085537.Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum 15855870		slity, very find sandy in parts,	016	040
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37. Dolomite, brown, fine granular to fine crystalline, with 5-7% gypsum 15 855 870		Coder Valley and Wapsipinicon Formations	~~~	~~~
fine crystalline, with 5-7% gypsum 15 855 870	37.	Dolomite, brown, fine granular to		
	-	fine crystalline, with 5-7% gypsum 15	855	870

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Rock	Unit	Description of Formation	Thick (Ft.)	From (Ft.)	10 (řt.)
38.		Dolomite. Grab gray. coarse			(- ••)
		crystalline, clastic (?) w	oek 10	870	880
39.		Dolomite, light buff, coarse			
		crystalling. clastic (?) w	osk 20	880	900
40.		Dolomite, 11ght gray, very fin	ne		
		crystalline, herd, brown in	n		
		lower 10', sith 25% white	lime-		
		stone with subsdral dolomit	ta		
		crystals between 915'-920'	•		
		Traco Expann	30	900	930
41.		No samole	5	930	935
42.		Dolomite, light brown to drab	-		
		grey, fine to medium cryste	a l l-		
		line, hard, with small per	cont-		
		age interstitial gypsum-	30	955	965
43.		Gypsum, white, massive bedded,	A		
•		in part brown or black	20	965	985
44.		Dolomite, brown to red brown.	fine		
		to extemely fine crystalling	10,		
		hard, vitroous, with small	•		
		percentages interstitial			
		gypsum in lower part	45	985	1030
45.		Dolomite, light brown, sugary	in		
		upper 5', very fine crystal	lline		
		below. 5-8% gray, porcelat	In		
		textured chort and traces			
÷		ey denn	20	1030	1050
46.		Dolomito, drab gray, fine to			
		modium crystallino, hard, w	vith		
4 mm		10-20% gypsum in lower 30*	49	1050	1099
47.		Shalo, light green, silty, fai	lr		
		shaly structure	6	1099	1105
48.		Dolomite, light brown, fine to)		
		medium orystalline	5	1105	1110
4y,		Shale, light gray, non-calcare	ous		
Fo		ontirely as mud	5	1110	1115
00.		Dolomite, sort, light gray, ff	ne		
		crystalling, weak, porous,	with		
•		smell percentages gypsum.			
ຣາ		Dolomite drills to mud	30	1115	1145
914 60		uypsum, white, messive bodded	80	1145	1165
U fi t		onate, rea, dense, and shale g	reen		
		gray, siightly uncruous, se	nay		.
		(10,5 mealum guartz sand)	10	1165	1175

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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, wi small percentage red and green cave, increase in quantity in lo	lth shalo wer		•
54.	15' Dolomite, drab gray, very fine crystelline, very hard, with 10-20% chert, part of which may be cave, and 25% red and	· 55	1175	1230
55.	green sandy shale Dolomite, light buff, very find crystalline, translucent,	20	1230	1250
56.	vitreous, sandy in lower 5' Dolomite, light drab to green, fine crystalline, translucer hard, with 40-60% white weat chert and occasional glaucor	20 nt, nered nite	1250	1870
	graine in lower part ORDOVICIAN SYSTEM <u>Maquoketa Formation</u>	35	1270	1305
57.	Shale, green and chocolate brow	m	_	
58.	Interbanded, micaceous No sample Shele mean more and brown	10	1305 1315	1315 1325
wu p	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 = 117/2 Production Il gpm Drawdown = 200 - 117 = 83' at 11 gpm. Well cleared after I hour then became muddy again showing that upper shales were probably coving. Well produced 25 gpm for 20 minutes. 90' of limestone. Well to be cased, drilled through 100't of Maple Mill and 100't into underlying 15 & dolom.

Forecast

MELBOURNE

Marshall County

Elevations:	Crossing	M&StL	1052
	Grossing	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, ba-wewat 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.

Top Top Top Top Top Top	of of of of	the the the the the	Mississippian Maple Mill Devonian Galena St. Peter Jordan	Approximately 540' 835 425' -280' -740' -1280'	5.10,1 70	Top Maple Millsh Old Fig. NG
Thic	kne					11 Lor
	Ba Ma	ase aple	of Maquoketa to Mill	Base of Glenwood	460' 75'	vec ^{it}
	0.5		tow and Demonia	Constant and a second s	05.01	

Silurian and Devonian Systems Galena - Decorah - Platteville St Peter Maquoketa

Sea Level elevations

650'

440' 53'

160!

KINDERHOOK SERIES Hampton Formation 351 four Falls Local detit - Entirely of Br. dol. · Oalite La Lith Is dol. Englity (42') 1. This bedded Oolite Lo 701 Hrd. br banded Kline crinoida Lo Maynes Creek Br foss. dol. interfedded with dt. mus -50' Chapin Except. foss. Br. Dol. & Cht (2) Brown Oclific Lis (E) (Lower Portion Epp Hear Le grand) Thickness Varies from 8-45" (in Frankley Co) 45 -2401

Total thickness of Kinderbook (Hampton only) Lowden 240' Thickness Hampton Traversed 110' 130' Remaining " " To be traversed 95' (struct. Map.) Thickness of Maple Mill shale Depth To top of Maple Mill from Thickness of Members of Hampton Form, 465 Gen. Log. of Adv. drilling. Eagle City (about Thru) Br. gray det. at Box, dol. in cent. P. + For Maynes Creek - Br. Foss Cht. with Interbender Cht. Chapin Brown oblitic Ls Maple Mill Sh - Soft Blue to gray, unct. Pyritic Sh. 151 50' 8-45' 95-1

Depth Structure Contour Maps Top Mississippion System 835' 560' 490" Top Maple Mill sh. Thickness 2751 Thickness of Kinderhook Iowa Falls 75' Eagle City 70' Maynes Creek 50' Chapin 45 Thickness 240' 5 351 Thickness of H. Grn. shale gls. (Meramec series P) 16'

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MEMORANDUM TO: H.G. Hershey From: H.J. Russell · Jubject: Well at Melbourne, Marshall County. Tentative curb elevation: 1050'A.T. Orillers log (McCutcheon to Hershey by phone) 218 0 218 Drift 52 218 270 Water at 260 Lime Shale ? 270 -The top of the limestone is in about the correct position to be the sop of the Mississippian since interpolation from the shucture contour map gives the top at a depth of 200't. Its probable age is Meramec. There is no evidence to indicate whether its age is St. Genevieve or St. Jouis. The thickness of the limistone (52') is not sufficient to account for all Post-maple mill missipsippian bels. On this basis, plus the fact that structure contour maps indecate the top of the Maple Mill at 525' Lepth, it is concluded that the shale is not Maple Mill in age but rather is a thin shale within the Meramec. Saudon and others

Lime at 218 2; Water 260 Shale below. 270 c 5951 Atkinso Curb 1050 McCutcheop Top Miss @ 218 Eliv. 1050± TOPMM+525 TOD MISS + 850 ± 10

indicate that this shales are to be expected within the upper Mississippian beds. On the basis of this information it is reccommended it that drilling continue to the Lop of the Maple Mill shale at about 530'. Wit is decided to penetrate the Maple Milland explore lower formations, the following data apply. Depth to Thick- Elev. Top ness A.T. Maple Mill 530 95'± +520+560 Devonian 600 ± +425 625 -200 Maguoketa 1225 125± Galena - 300 1350 440'± 50'± St. Peter -740 1790 Jordan 2330 -1280

Provision is hereby made to revise estimates as drilling progresses, particularly when the top of the Maple Mill is reached. HR. 12/14/38