HILLSDALE WELL.

	Thickness, feet.	Depth, feet.
Drift	?	?
Soft laminated micaceous sandrock	?	20
Mainly bluish shales with arenaceous seams and harder, probably calcareous ledges. The color of the shales became dark, bituminous, in the lower part (Sunbury?)	1100	1120
Hard red rock with much iron pyrite, and strongly saline water	230?	1350?
Fifty feet of white limestone	50?	1400?
Soft calcareous rock to end	150?	1550

OSSEO WELL.

C. M. DeWitt, owner. Lige Curry, driller, Bradner, Ohio.

(Record from a few samples and data furnished by C. M. DeWitt.)

Elevation about 1065 ft. A. T.	Thickness, feet.	Depth, feet.
Drift	214	214
Coldwater shale:		
Blue shales	700	914
Berea? (Apparently horizon absent or not recognized.)		
Antrim shale:		
Brown or black shales	231	1145
Stray "oil sand"	5	1150
Black shale, pyritic, odor of petroleum	64	1214
Traverse (Hamilton) Formation:		
Pepper and salt	5	1219
Dark brown rock, gas	5	1224
Lighter brown rock, more gas	5	1229
Lighter rock. Some oil and more gas. 100 ft. of salt water in well	30	1259
Lighter rock. Water rock very light or hard salt "sand." 400 ft. of mineral water in well	20	1279
Very light hard rock or "salt sand." Fine drilling	25	1304
Light rock becoming darker with bluish cast (shaly?)	21	1325
Rock of a bluish cast (shaly?)	25	1350
More salt water bearing rock	30	1380
Dundee:?		
Brown rock. Heavy flow of water and gas. Water rose to within 330 ft. of the surface	20	1400
The "Trenton" (Dundee limestone) with showing of oil and big flow of gas	20	1420
Light brown rock of yellowish cast. Pebble oil rock, very porous	10	1430
Well afterwards filled in with cement and stone for 150 ft. and gas rock shot. "Lots of oil if head of water is pumped off." Gas pressure originally 70 pounds.		

CHURCH & CO. WELL NO. 5.

Loc.: Church & Co. plant, Trenton.

Elevation about 580 ft. A. T.	Thickness, feet.	Depth, feet.
Surface	75	75
Dundee and Upper Monroe undivided:		
Limestone; moderate to brisk eff	65	140
Limestone; fairly brisk eff.; darker and coarser splinters than beds below; Allegan well 1260+ and St. Clair River 520 ft. resemble the top of the Trenton; light brown limestone	10	150
Limestone fine grained and light buff, moderate to brisk eff	40	190
Samples missing, doubtless limestone	30	210
Genuine limestone, very brisk eff., Amherstburg, Anderdon quarries	10	220
Dark brown limestone, moderate to very brisk eff	20	240
Limestone and dolomite	10	250
Sample missing, probably limestone or dolomite	10	260
Limestone and dolomite with bluish tinge	10	270
Dolomite	10	280
Sylvania or Middle Monroe:		
Fine grained white sandstone	120	400
Dolomite with chert	10	410
Fine white sandstone with white chert	10	420
Sample missing	10	430
Very calcareous sandstone	10	440
Pure white sandstone	10	450
Sandy limestone or dolomite	10	460
Pure white sandstone; water	10	470
Dolomitic sandstone	10	480
Lower Monroe:		
Dolomite with scarcely any sand	10	490
Dolomite, moderate eff. at top, slower toward bottom	110	600
Very fine grained calcareous marl, fairly rapid eff	10	610
Dolomite, with little or no gypsum	60	670
Much white chert with shaly streaks down to 660 ft.		
Dolomite and anhydrite	60	730
Mainly dolomite and anhydrite	70	800
Moderate eff. in places. Dark bluish shales	10	810
Compare Wyandotte at 800-860 ft., Ford No. 23, 700-735 ft.		
Gypsiferous dolomite passing into bluish gypsiferous shales	30	840
Anhydrite with fragments of green shale	30	870
Salina:		
Nearly pure gypsum	20	890
Cream colored dolomite, gypsiferous	40	930
Buff dolomite	20	950
Dark shale	10	960
Blue light yellow and buff dolomite	20	980
Brown dolomite and blue, green and gray shale	10	990
Dark bluish gray shale with buff dolomite and bluish gray gypsiferous beds	10	1000
Bluish shale, gypsiferous at times	170	1170
Light buff or cream colored dolomite	20	1190
Largely bluish shales, gypsiferous	50	1240
Dark dolomitic shales, dolomite, anhydrite at 1280 ft. and bluish to brown dolomites below	50	1290
Buff dolomites	80	1370
Smell of gas at 1310 and 1340 ft.		

E. TWARK WELL.

Loc.: Emil Twark farm, S. E. ¼ of N. W. ¼, sec. 12, Romulus Twp.

Elevation 620 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Drift	92	92
Gravel	3	95
Lime	21	116
Gray limestone	25	141
Bell (Marcellus) shale:		
Coal (black bituminous shale probably)	2	143
Black slate	7	150
White lime	7	157
Black slate	15	172
Black shale	10	182
Dundee (Corniferous) limestone:		
Lime	63	245
Black shale	5	250
Lime	36	286
Black lime	12	298
Upper Monroe or Detroit River Series:		
Gray lime	24	322
White lime	63	385
Sylvania (Middle Monroe):		
White sand	5	390
Black slate	8	398
White sand	65	463
Sand rock	22	485
White lime	15	500
Sand rock	45	545
Lower Monroe or Bass Island Series:		
White lime	240	785
Blue lime	10	795
White lime	75	870
Brown shale	12	882
White lime	43	925
Salina:		
Salt rock	35	960
White lime	25	985
Brown shale	15	1000
Salt rock	46	1046
Slate	7	1053
Salt rock	34	1087
White lime	30	1117
Salt rock	25	1142
White lime	32	1174
Fine white salt	24	1198
Lime	7	1205
Salt rock	53	1258
Lime	5	1263
White lime	7	1270
Salt	20	1290
Lime	25	1315
Shells and slate	62	1373
Lime	26	1398
Salt rock	27	1423
Shells and slate	30	1453
White lime	23	1476
Salt rock	45	1521
Slate	20	1541
Salt rock	27	1568
White lime	15	1583
Salt rock	20	1603
Lime	20	1820

WYANDOTTE WELL.

Lancy and Churchill, contractors. Record from C. E. Wright and A. Winchell. Driller's record.

Elevation 580 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Clay and gravel	75	75
Dundee (Corniferous):		
Dark limestone	15	90
Light brown limestone	10	100
Gray limestone	25	125
Upper Monroe or Detroit River Series:		
Brown sand with "slate"	30	155
Brown sand and lime	5	160
Brown and white limestone	70	230
Sylvania (Middle Monroe):		
Free-stone	60	290
Lower Monroe or Bass Island Series:		
White and brown limestone (white and black sand. W.)	70	360
Gray limestone	5	365
Shelly limestone	30	395
Brown limestone	5	400
Muddy limestone	30	430
Very dark limestone, struck sulphur water	104	534
Limestone and "slate"	66	600
Slate and soapstone (caved to this point. W.)	15	615
Limestone and "slate" (? how far gypsum. L.)	75	690
White limestone and slate	40	750
Salina:		
White lime and salt mixed	70	800
Pure white salt	30	830
Salt and lime, shelly	40	870
Light brown limestone	30	900
Light brown shaly limestone	20	920
Dark brown shaly limestone	20	940
Pure salt	15	955
Sand and lime	5	960
Pure salt	5	965
Salt and lime shell	5	970
Lime and "slate," shaly	75	1045
Pure limestone	10	1055
Slate and brown limestone	5	1060
Pure brown limestone	20	1080
Pure brown salt	10	1090
Pure white salt	100	1190
Salt and brown limestone	45	1235
Dark shaly limestone	5	1240
Dark limestone	90	1330
Very dark limestone	5	1335
Brown limestone	5	1340
Blue limestone	10	1350
Brown limestone	10	1360
Brown limestone, very hard	5	1365
Hard dark limestone	5	1370
Brown and blue limestone	5	1375
White and blue limestone mixed	50	1425
White crystalline limestone	15	1440
Brown and white limestone. Water	35	1475
Fine brown limestone. Gas	25	1500
Fine brown limestone	10	1510
Niagara at 1510 ft., Guelph and Lockport:		
Limestone (dolomite)	350	1860
Rochester:		
Slate (shale)	10	1870
Clinton:		
Limestone	20	1890
Red rock (red shale or clay) Medina?	110	2000
Medina, Richmond:		
Black slate	20	2020
Red rock (red shales)	80	2100
Slate	95	2195
Red rock (red shales)	5	2200
Lorraine:		
Gray sand	10	2210
Slate (shale)	40	2250
Dark grayish shale; no eff	250	2500
Trenton at	.....	2610

Elevation 574 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Muck, thin clay. Surface deposits	62	62
Upper Monroe or Detroit River Series:		
Light buff dolomites at 10 ft., perhaps oolitic	75	137
At 82 to 92 ft. rather brisk eff., generally moderate to slow, some rounded sand grains.		
Dolomites dark brown, bituminous, with sulphur and sometimes pyrites, with moderate eff. Compare Church No. 5 down to 290 ft	60	197
Sylvania (Middle Monroe)	65	262
Quartz sand, clear, very fine, most of the grains from .5 to .2 mm., rounded down to some where between .1 and .25mm. Compare Ford 23, 235-325; Mt. Clemens, 965.		
Dolomite, light, eff. moderate, in specks (due to crystals perhaps). Compare Ford 23, 325–340	20	282
Silicious dolomite	35	317
Dark brown, with red, rusty quartz sand and pyrites in spots, and very cherty at the base. Compare Ford No. 23, 375-435.		
White sand like that above	35	352
Sandy dolomite	10	362
Grains rounded down to .16 mm.		
Lower Monroe or Bass Island Series:	.....	362
Cherty dolomite	50	412
Dolomite, dove colored, with relatively little chert	20	432
Dolomite	30	462
Bluish, buff, massive.		
Coarse chips at 337-447. Compare Edison 462-377.		
Brown dolomite	15	477
Light dolomite	15	492
Dark dolomite	35	527
Light dolomite	25	552
Stylolitic with black specks.		
Impure gypsum	45	597
Bluish, with some dolomite and nearly pure at 587 ft.		
Compare Edison, Fort Wayne, 900-950, especially 925 with 587.		
Compare Church No. 2 at 720 ft.		
Anhydrite is quite abundant at 627 ft.		
Compare Edison, Fort Wayne, 1000 ft.		
Dolomite	20	617
Oolitic at 602 ft.		
Bluish dolomite and anhydrite	113	730
Salina:		
Salt and dolomite	60	792
At 730 ft. is the first salt. The Edison Fort Wayne well seems to have salt at higher levels, the first salt there at 1010 ft., belonging to the upper part of this group apparently. Compare Church No. 5 at 890 ft.		
Eureka, Wyandotte, 730-800.		
Ford No. 1, 830.		
Solvay No. 13, 880.		
Solvay No. 16, 890.		
Romulus, 925.		
Tecumseh Salt Co., 828.		
River Rouge Imp. Co., 815.		
River Rouge Salt Co., 871.		
Detroit Salt Co., 906.		
Stroh Brewery, 1150.		
Royal Oak, 1543.		
New Baltimore, 1600.		
Saint Clair, 1600.		
Marine City, 1604.		
Port Huron, 1500.		

J. B. FORD No. 1 WELL.

Loc.: Michigan Alkali Co. Plant, Wyandotte.

Elevation about 580 A. T.	Thickness, feet.	Depth, feet.
Surface, clays, etc	63	63
Upper Monroe:		
Limestone	199	262
Sylvania sandstone	110	372
Lower Monroe:		
Limestone (dolomite)	458	830
Salina:		
Salt	46	876
Limestone (dolomite)	92	968
Salt	8	976
Limestone (dolomite)	8	984
Salt	9	993
Limestone (dolomite)	133	1126
Salt	87	1213
Limestone (dolomite)	10	1223
Salt at	.....	1300

Elevation 574 ft. A. T.	Thickness, feet.	Depth, feet.
Salt	50	842
Dolomite, hard	80	922
Compare Wyandotte 870-900 ft.		
Dolomite with anhydrite	10	932
Anhydrite with salt	10	942
While this is the second salt in this well, and would thus correspond to 940 ft. at Wyandotte, Eureka well, and 852 ft. at Ford No. 23 (probably really to 1027 ft.) it is probable that these salt beds are not persistent. Edison, Fort Wayne, 1280-1292 ft., may also correspond. Ford No. 1 is the same.		
Dolomite	5	947
This is merely a parting, but seems fairly persistent. Compare Ford No. 1, 968-976; Wyandotte, 960.		
Salt	15	962
Dolomite, anhydrite and clay	100	1062
Almost solid anhydrite	5	1067
Compare:		
Edison, Ft. Wayne, 1400 ft.		
Wyandotte, 1045.		
Dolomite and anhydrite	50	1117
The base of this is the top of the main and, it seems to me, the most persistent salt bed. We should then compare:		
Church No. 6, Trenton, 1280.		
Wyandotte Eureka, 1080-1235 (less 45 ft.)		
Morton, 1119-1323.		
Romulus, 1475-1600 with partings.		
Milan, 1540-1545.		
Zug Island, 1290-1528.		
Solvay No. 11, 1370-1602 with parting.		
Edison, Ft. Wayne, 1445-1636.		
Stroh, 1565-1815.		
Royal Oak, 2115-2475.		
Port Huron, 1991-2190.		
Salt, dolomite and anhydrite mixed	5	1122
Salt, samples to 1137 ft	201	1323

SOLVAY PROCESS COMPANY WELL, NO. 13.

Loc.: Near Delray plant.

Elevation about 575 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Alluvium (clay, sand, etc.)	86	86
10-in. casing.		
Dundee and Upper Monroe or Detroit River Series:		
Limestone	64	150
Slight flow of sulphur water.		
Limestone	150	300
Large flow of sulphur water.		
Limestone	51	351
8-in. casing.		
Limestone	71	422
Large flow of water.		
Sylvania (Middle Monroe):		
Sandstone	90	512
Lower Monroe or Bass Island Series:		
Very hard limestone	368	880
Salina:		
Salt	40	920
Limestone	5	925
Salt	5	930
Limestone	15	945
Salt	30	975
Limestone	5	980
Salt	25	1005
Limestone	25	1030
Salt	25	1055
Limestone	15	1070
Salt	65	1135
Limestone	37	1172
6-in. casing.		
Limestone	53	1215
Salt	10	1225
Limestone	140	1365
Salt	120	1485
Limestone	10	1495
Salt	105	1600
3-in. casing.		
*Limestone	3	1603
Bottom of well.		

*All of the ''limestone'' in the Lower Monroe and most of it in the Upper Monroe is probably dolomite.

SOLVAY PROCESS COMPANY WELL, NO. 16.

Elevation about 575 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Alluvium (clay, sand, etc.)	87	87
Bottom 10-in. casing.		
Dundee and Upper Monroe or Detroit River Series:		
Limestone	38	125
Slight flow of sulphur water.		
Limestone	100	225
Increased flow of sulphur water.		
Limestone	100	325
Large flow of sulphur water.		
Limestone	30	355
Bottom 8-in casing.		
Limestone	75	430
Sylvanian or Middle Monroe:		
Sandstone	60	490
Hard limestone	35	525
Sandstone	15	540
Lower Monroe or Bass Island Series:		
Very hard limestone	20	560
Limestone	330	890
Salina:		
Salt	43	933
Limestone	6	939
Salt	12	951
Limestone	19	970
Salt	28	998
Limestone	7	1005
Salt	25	1030
Limestone	35	1065
Salt	35	1100
Limestone	20	1120
Salt	30	1150
Limestone	19	1169
Bottom 6-in. casing.		
Limestone	76	1245
Salt	12	1257
Limestone	5	1262
Salt	5	1267
Limestone	138	1405
Salt	203	1608
Limestone	4	1612
Salt	6	1618
Bottom 3-in. casing.		
Salt, bottom of well	7	1625
Well commenced flowing Aug. 6, 1906.		

ZUG ISLAND WELL.

Elevation about 575 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Clays and surface earth	73	73
Dundee and Upper Monroe or Detroit River Series:		
Dolomite?	52	125
Shale	35	160
Dolomite?	60	220
Sylvania (Middle Monroe):		
Sandstone, 94 per cent SiO	22	342
Sandy lime	88	430
Lower Monroe or Bass Island Series:		
Soapstone (Calcareous shale?)	125	555
Brown lime	30	585
Gray lime	55	640
Lime	35	775
Limestone	25	800
Salina:		
Salt	40	840
Mixed lime	32	872
Salt	56	928
Lime	27	955
Salt	20	975
Lime	10	985
Salt	55	1040
Lime	88	1128
Salt	16	1144
Lime	6	1150
Salt	15	1165
Lime	25	1190
Shales	17	1207
Slate	83	1290
Salt	228	1528

SECTION OF OAKWOOD SALT SHAFT.[5]

Loc.: One-half mile south of the River Rouge in Oakwood, a small suburb of Detroit.

Elevation of mouth of the shaft, 575.2 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or surface deposits:		
Blue boulder clay	73	73
Sand just above rock, water	10	83
Dundee (Corniferous):		
High grade limestone with some chert nodules	63	146
Quite heavy flow from 86 to 88 ft.; rank in hydrogen sulphide gas; small flow at 135 ft.		
Upper Monroe or Detroit River Series:		
Lucas	170	316
Bluish to brownish gray porous dolomite much of it finely laminated, with streaks of asphaltum. Small amount of gypsum. Poor in fossils. Flow from 155 ft. to 168 ft.; flow continuing down to 181 ft. Sulphurous; temperature at 180 ft. was 49.5° F. (Cooper). Remarkably heavy flow at 191 ft. from a horizontal opening extending across the shaft. Water strong in sulphur and under a pressure of 90 lbs. per square inch, causing the shaft to fill in 3 to 4 hours.		
Amherstburg:		
Brownish, laminated dolomite	19	335
Anderdon:		
High grade limestone, rich in fossils. Some celestite	38	373
Flat Rock:		
Dark drab dolomite, with few casts and moulds of fossils. Some concretions and gypsum	47	420
Sylvania (Middle Monroe):		
Snow white sandstone more or less cross bedded. Generally incoherent compacted into sandstone from about 490 to 510 ft	113	533
Seepage flow of sulphur water throughout Sylvania sandstone, except for 27 foot stratum of dry siliceous dolomite (Sylvania dolomite).		
Mr. Bradt, the engineer, estimated the total flow above the base of the Sylvania as 2,000,000 gallons per minute, this being reduced to not over 500 gallons by the use of Portland cement forced into the fissures of the rock under a pressure of 1200 lbs. to the sq. in. The vein at the depth of 191 ft. required several carloads of cement before the flow could be controlled, and the services of a driver to insert the pipe at the proper point. Preparatory to blasting, holes were drilled obliquely about the margin of the shaft, one foot apart, and into these were forced all the cement slush that they would receive. In the case of the Sylvania, a concrete lining, 24 to 30 inches thick was required to restrain the flow. Below the Sylvania, the flow was greatly reduced and finally completely disappeared.		
Lower Monroe, Bass Island Series:		
Raisin River:		
Bluish gray or brownish laminated dolomite with occasional oolitic strata. Line of separation between this and Sylvania very distinct. "Like a floor from which sand could be swept." Some chert nodules and pyrite. Bed of breccia encountered about 580 ft. Some fossils	124	657
Put-in-Bay (Possibly including Tymochtee):		
Bluish to brownish dolomite with seams of fossils. Thin strata of breccia and oolite. Some selenite, alabaster, anhydrite, calcite, asphaltum, and pyrite. Shaly and carbonaceous in places. Dolomite shows "gashed structure" at certain levels. Veins of salt encountered near bottom	220	877
Salina:		
Salt and dolomite irregularly mixed. No fossils found	83	960
Salt	10	970
Salt and dolomite	50	1020
Salt, slightly blotched with dolomitic slime	20	1040
Present bottom of shaft at 1060 ft.		
Salt and dolomite	70	1110
Salt	30	1140
Salt and dolomite	199	1339
Salt	25	1364
Dolomite	73	1437
Salt	369	1806
When entered, this bed will probably be found to be divided by minor strata of dolomite.		

[5] Sherzer: Geology of Wayne Co., Pub. 12, Geol. Ser. 9. Fig. 21.

EDISON POWER AND LIGHT CO., NO. 1 WELL.

Loc.: At plant just below Ft. Wayne. Record by A. C. Lane from samples.

Elevation 585 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Drift	97	97
S. 25-90 ft. blue eff. calcareous clay, 10 in. casing to 102 ft.		
Dundee (Corniferous) limestone:		
Limestone	203?	300?
S. 160 moderate eff.; S. 185 fierce eff.; S. 300 fierce, chipping, bluish. A piece which may have broken from above is large and characteristic Corniferous with A. reticularis, Fenestella, etc. If there is not some mistake in the samples it seems quite probable that the 300 ft. sample happens to be from a coral reef in the Lucas. Eight inch casing to 350 ft.		
Upper Monroe or Detroit River Series:		
Lucas Dolomite	150	450
S. 400 brown, slow eff.; S. 440 same.		
Sylvania sandstone (Middle Monroe)	175	625
S. 450 pyritic sandstone, with some dolomite, secondary quartz addition; S. 500 clear white sand rock; S. 600 the same; compare Ford No. 4, 257-375, Wyandotte Eureka 230-360, Church 290-475; River Rouge 350-500; Solvay 410-490; Oakwood 418.		
Lower Monroe or Bass Island Series:		
Dolomite, brown	75	700
S. 625 cherty dolomite, with numerous white grains of solid chert as well as dolomite; S. 650 dolomite, granular, sandy looking, brown, a few grains of sand.		
Dolomite, blue	25	725
S. 700 Mainly dolomite, slow eff., a few grains of selenite, bluish.		
Dolomite, brown	50	775
S. 725 slow eff., dark, chipping; S. 750 massive brown coarse chips.		
Dolomite, light	125	900
S. 775 slow eff.; S. 800 pure dolomite; S. 845 almost wholly dolomite, a little anhydrite under microscope; S. 875 mainly dolomite and anhydrite in a trace.		
Anhydrite mainly	50	950
S. 900 about half dolomite, half anhydrite; S. 925 almost all anhydrite, a little gypsum.		
Dolomite	50	1000
S. 1000 mainly anhydrite with flakes of selenite and dark dolomite.		
Salina:		
Salt	25	1035
S. 1010 brown salt; S. 1025 white salt.		
Limestone	5	1040
Salt	30	1070
S. 1040 brownish white salt.		
Limestone	22	1092
S. 1080 mainly dolomite, a little anhydrite.		
Salt	25	1117
S. 1115 white salt.		
Limestone	5	1122
S. 1112 dolomite mainly, a little anhydrite.		
Salt	38	1160
S. 1140 clear, coarse grained salt, beds from 1010-1160 compare with Wyandotte 730-870.		
Limestone	120	1280
Six inch casing to 1180 ft.		
This probably marks the interval between the first and second epochs; (Volume V, 1895, p. 28), compare.		
S. 1160 is dolomite salt, anhydrite and quartz.		
S. 1165 is half dolomite, half anhydrite.		
S. 1200 and 1200b are reddish brown, rusty with some sand, but mainly dolomite, no anhydrite.		
S. 1250 gave slow eff., is stuck together and has more dolomite, than anhydrite.		

CANADIAN PACIFIC R. R. WELL NO. 11, WINDSOR.

Elevation about 610 ft. A. T.	Thickness, feet.	Depth, feet.
Surface and hard white dolomite (Dundee absent?):	235	235
Monroe or Detroit River series:		
Dolomite, hard fawn colored	15	250
Dolomite, marly, drab	50	300
Limestone, dark color, petroliferous	25	325
Dolomite marly	10	335
Dolomite marly, drab	30	365
Dolomite marly, gray	25	390
Dolomite vesicular, drab	20	410
Limestone	30	440
Dolomite, crystalline, fawn colored	20	460
Limestone, drab	75	535
Sylvania (Middle Monroe):		
Sandstone, quartzose (Sylvania)	55	590
Lower Monroe or Bass Island Series:		
Dolomite, fawn	10	600
Dolomite, with gypsum, gray	40	640
Dolomite, shaly, drab, somewhat arenaceous	30	670
Dolomite, drab gray	90	760
Dolomite, fawn (dolomite? 670-700)	40	800
Dolomite, hard, drab gray	25	825
Dolomite, shaly, gray	15	840
Dolomite, fawn	40	880
Dolomite, drab gray	80	960
Dolomite, fawn gray	70	1030
Dolomite, drab gray with gypsum	40	1070
Dolomite, shaly, drab gray	30	1100
Dolomite, drab gray	27	1127
Salina:		
Salt	40	1167

EDISON POWER AND LIGHT CO., NO. 1 WELL.—Concluded.

Elevation 585 ft. A. T.	Thickness, feet.	Depth, feet.
Salt	12	1292
Compare Wyandotte 940-970.		
Limestone.		
S. 1300 is mainly dolomite with some anhydrite.		
Argillaceous limestone "Shale"	55	1365
S. 1310 greenish, earthy, with a granular calcite powder.		
Limestone	80	1445
S. 1400 light buff, slow eff., with some anhydrite.		
Salt	191	1636
S. 1445 not clean, brown salt, at 1500 ft. and 1600 ft. clean salt.		
Compare Wyandotte 1080-1235.		
Limestone and anhydrite	20	1656
S. 1655 Strong reaction for SO_3, brilliant polarization colors. 1656 feet of 3-inch tubing.		

DETROIT NATURAL GAS CO. WELL.

Loc.: 7 mi. N. and 3 E(?) of Jefferson Ave.

Elevation about 630 ft.? A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Gravel and gas (would burn)	100	100
Gravel	25	125
Antrim:		
Black shale	8	133
Hard shale	7	140
Gas and water (would light) at 165 ft.		
Black slate	52	192
Traverse (Hamilton) Formation:		
Shelly sandstone	34	226
Limestone	14	240
Soapstone (calcareous shale)	160	400
Hard slates and limestone	75	475
Dundee (Corniferous):		
White sandstone, quite hard	105	580
(Probably cherty limestone shales).		
Limestone (Monroe)	190	770
Still in limestone.		

STROH'S BREWERY WELL.

Loc.: At plant on Gratiot Ave., Detroit.

Elevation about 620 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Blue clay	110	110
Hard pan	30	140
Boulders	14	154
Traverse Formation	164	300
Dundee limestone and Upper Monroe, or Detroit River dolomites, with sulphur water in the latter	315	615
Sylvania sandstone	85	700
Lower Monroe, or Bass Island Series:		
The lime rock hard at 730 ft., sandy at 80 ft., and hard pan 900 to 1150 feet.		
Salina:		
Salt	55	1205
Limestone	201	1406
Salt	250	1815
Limestone (Lower part Niagara?)	282	2097

ATLANTIS WELL.[9]

Loc.: North of State Normal College Campus, Ypsilanti. T. C. Owen, owner.

Elevation 785 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Sand, clay, gravel, etc., unconsolidated	185	185
Antrim:		
Shale, soft	4	189
Sandstone, fine, slightly calcareous, fresh water	10	199
Limestone, fine—all dissolves in acid	10	209
Shale, dun, dark; lower 74 ft. black	84	293
Shale, sandy, dun	64	357
Traverse?:		
Sandstone, very fine, slightly calcareous; yields bromine water	4	361
Limestone, pale, cherty	10	371
Shale, sandy	5	376
Limestone, ranging from pale and cherty to dun and sparry. Brine at 404 ft. directly beneath a very hard streak	43	419
Shale, bluish to dun, in places gritty	22	441
Limestone, varying from silicious to pure	24	465
Shale	21	486
Dundee? (Top uncertain but probably below 525ft. Cf. Banner Oil and Gas Co. well.):		
Limestone, varying from pale to dun, with some shaly partings, portions magnesian, others silicious; contains sulphurous (H_2S) water	138	624
Unrecorded	184	808
Monroe probably below 680 ft		808

[9]Record from A. Winchell's Mss., by W. H. Sherzer, Geol. of Wayne County, Pub. 12, Geol. Ser. 9, 1911, p. 189.

BANNER OIL & GAS CO. WELL.

Loc.: Three hundred feet from Cornwell well near Ypsilanti Water Works plant. Banner Oil & Gas Co. and Ypsilanti Development Co. A. H. Marsh, contractor. Samples at 700, 1150 and 1200 ft.

Elevation 682 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene	90	90
At base of gravel water flows with T. 50.2°. T. 49.7° at 90 ft., 10 inch drive pipe to 91 ft., T. 51.2° at 128 ft.		
Devonian Antrim:		
"White shale"	51	141
"Some gas" at 135 ft.? A little water, no odor.		
Black shale	150	291
Traverse Formation:		
Limestone shale	25	316
With a flow of gas. Hard shells at 300 ft. T. 53° F.		
Brown shale	204	520
This Traverse is also reported as 50 ft. limestone, then blue shale, then black shale, then limestone, then black shale, and the change to Dundee at 525 ft. At 520 ft. T. 57.2° F.		
Dundee limestone:		
Limestone	160	680
S. at 600 tests limestone according to Sherzer. Mineral water at 525 ft., 530 ft. with gas H_2S, also at 570 ft.		
Upper Monroe:		
Dolomite	80	760
S. at 700 ft. slow eff. dolomite; at 680 ft., more water quite salty with some gas and traces of oil, e. g., at (730 ft.) or 720 ft., at which point it was fruitlessly shot with nitroglycerin, Nov. 16, 1904.		
At 710 ft. T. 59.4° F	400	1200?
Sylvania:		
White sandstone "375 ft. to 390 ft." of it at 1150 ft.		
S. 1150 ft. typical Sylvania sandstone, white, Dec. 17, 1904.		
S. water at 1175 ft.		
S. 1200 brownish sandstone, Feb. 9, 1905, looks like the samples near the bottom of the Sylvania.		
Well 1210 ft. deep. Ypsilanti Press, Oct. 4, 1905. ("Has it been deepened?"—Lane.)		

CAMPUS WELL.

(Drilled in 1899–1900.)

Loc.: Campus of University of Michigan, Ann Arbor. Record by Dr. A. C. Lane.

Elevation 875 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Soil, fine sand	45	45
Gravelly, 10 ft., large boulder at 80 ft., casing to 90 ft	45	90
Bluish clay, large boulder at 113 ft	145	235
Coldwater shales:		
Bluish shales	30	265
Red shale	15	280
Plugged at 287 ft. and water above analyzed 4.3 per cent salt.		
Blue shale	75	355
Fine soft gray and black shale	20	375
Fine gray sandy shale	10	385
Fine bluish shale	15	400
Berea grit:		
Fine gray sandstone	15	415
(No water noted).		
Fine sandy shale	25	440
Glossy black shale	5	445
Fine gray sandy shale	75	520
Salt water at 515 ft. and below.		
Antrim shales:		
Fine black and green shale	10	530
Fine gray sandy shale	15	545
Very fine black shale	15	560
Black bituminous shale	15	575
Coarse gray sandstone	5	580
Black sandy shale	20	600
Black bituminous shale	80	680
Traverse Formation:		
Shale with pyrite	5	685
Gray calcareous shale	60	745
Dundee limestone:		
Gray cherty limestone	30	770
Light gray limestone	30	800
Gray argillaceous limestone, some gas indications	130	930
Upper Monroe:		
Light gray dolomite	40	970
Limestone at 950 feet struck a mineral water charged with H_2S which rose 300 ft. and contained 13 per cent salts, according to Eberhard.		
Light gray dolomite, sandy	60	1030
Nov. 18th operations were suspended for a month at the end of the first 1000 ft. in an oily dolomite or limestone.		
Light gray dolomites with Sylvania sand grains	205	1235
Jan. 5th at 1065 ft. a red rock with much iron was struck.		
Sylvania sandstone:		
Pure white friable sandstone	35 +	1270 +
According to newspapers at 1275 ft. on Feb. 10th another mineral water strong of H_2S with 17 per cent salts (Eberhard) was struck in limerock.		
At 1300 ft. the rock is said to have been a little softer. The well was shut down Feb. 26, 1900, at 1326 ft., plugged at 283 ft. and tested. Then a cement plug of 25 ft. was put on top, but the analysis of the water remained practically the same.		

ROYAL OAK WELL.

Mfg. & Gas Co., Hugh Monroe, driller.

Elevation 678 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or Surface:		
Clay	40	40
Gravel	5	45
Clay	25	70
Quicksand and gravel	94	164
Antrim (Huron):		
Black shale	141	305
Traverse (Hamilton):		
Limestone	85	390
Brown shale	130	520
Dundee (Upper Monroe or Detroit River Series in lower part):		
Salt water at 548 ft. and 583 ft.		
Limestone containing salt water. (As this record does not distinguish dolomite and limestone, we cannot fix the boundary between the Monroe and Dundee limestone)	316	836
Salt water at 720 ft.		
Sylvania:		
White sand. Salt water at 836 ft	154	990
Very soft white sandstone 836-1105 ft.		
Limestone. "Struck white sand 990-1095, very soft," (May this be anhydrite?—Lane.)	115	1105
Lower Monroe or Bass Island Series:		
Very gritty hard limestone	20	1125
Dark sandrock, gray	15	1140
Blue hard gritty limestone	35	1175
Very soft light colored lime	40	1215
A little closer	45	1260
Hard close bluish limerock	145	1405
Hard gray sandrock	5	1410
Hard limerock	10	1420
Hard gritty limerock	45	1465
Rotten lime or shale. (The "shale" and "slate" are probably largely anhydrite, or at times dolomitic marl)	78	1543
Salina:		
Solid rock salt	97	1640
Hard shale	10	1650
Nice quality of salt	45	1695
Slate, rotten lime or shale, marly	40	1735
Salt	57	1792
Hard blue lime	18	1810
Shale	10	1820
Salt	80	1900
Soft gray lime	10	1910
Hard lime	95	2005
Salt	15	2020
Slate	95	2115
Salt	35	2150
Slate	15	2165
Salt	20	2185
Slate	15	2200
Salt	100	2300
Slate	15	2315
Salt	160	2475
Hard blue lime	27	2502

PONTIAC WELL.

Pontiac Natural Gas & Oil Co., G. S. Duncan, contractor. Record by C. E. Wright, from samples and driller's log.

Elevation 934 ft. A. T.	Thickness, feet.	Depth, feet.
Surface	320	320
Coldwater:		
Blue shale	10	330
Blue argillaceous shale	10	340
Calcareous argillaceous sandy shale; light blue; very fine grained	30	370
Sandy argillaceous shale, light blue	70	440
Sandy argillaceous shale	40	480
Reddish argillaceous shale	20	500
Sunbury shale:		
Dark brown argillaceous shale	35	535
Berea sandstone:		
Light drab sandstone; fine grained. Salt water	20	555
Light drab sandstone, fine grained	17	572
Gray sandstone	236	808
Antrim shale:		
Black shale	157	965
Traverse Formation:		
Coarse-grained argillaceous limestone, dark drab	35	990
Fine-grained limestone, light drab; 2 per cent insoluble residue	10	1000
Limestone, light drab and grayish white; 8 per cent insoluble residue	7	1007
Limestone, light gray; 20 per cent insoluble residue	8	1015
Sandy limestone, dark drab; 20 per cent insoluble residue	35	1050
Argillaceous limestone; 10 per cent insoluble clay residue	15	1065
Light blue calcareous clay; 90 per cent insoluble residue	50	1115
Salt water; very strong brine at 1115 ft.		
Dundee limestone (top above 1220 ft.) and Monroe Beds:		
Monroe not separated from Dundee.		
Limestone, light gray, drab to dark drab 1220 to 1350 ft.		
Show of gas at 1300 ft.		
Sandy limestone; light gray, brisk eff.; residue 20 per cent gray sand and some glassy grains at 1350.		
At 1497 ft. in gas-rock for 40 ft. (?), but 1100 ft. water in well.		

HOLLY MUNICIPAL WELL.

Notes kept by D. M. White of well drilled at Holly, by Kinney and Coleman; 8 inch well.

	Thickness, feet.	Depth, feet.
Pleistocene:		
Sand and gravel	140	140
Soft clay	40	180
Sand and gravel	10	190
Soft clay	40	230
Like we had at 140 to 180 feet.		
Sand and gravel	35	265
Bottom of pipe 265 feet.		
Lower Marshall:		
Light drab shale with shells of sandstone running through it	135	400
Coldwater:		
Light drab shale very much like clay, but does not cave, soft	130	530
Gray sand rock; a little bit of water with salty taste	7	537
Blue shale, some harder than light drab shale	73	610
Dark sand rock, more salty water	10	620
Light drab shale	50	670

MT. CLEMENS WELL NO. 3.

Loc.: Claim No. 141. Owner, Mr. Coursin; driller, Mr. Nims. Drilled in 1892. Samples furnished by driller, through T. M. Crocker.

Elevation 617 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Wet dark gray sand with an oily smell and moderately free eff. Rock at 123 ft.?	35	35
Record missing	88	123
Antrim shale:		
Burns with an aromatic odor, in shaly flakes; black; smells oily	17	140
Like the above, not so bituminous, tastes of ferrous sulphate	70	210
Traverse (Hamilton) Formation:		
Mixture of black shale and of a limestone like that at 260 ft.; eff. not very brisk; traces of gypsum in solution	8	218
Light buff limestone with traces of shells; very brisk eff	67	285
The same; no gypsum	15	300
Unrecorded	100	400
Dundee (Corniferous) limestone:		
Light buff even grained; very brisk eff; no $CaSO_4$	160	560
Light buff; even grained; very brisk eff., no $CaSO_4$. Gas at 600 ft. and at intervals for the next 200 ft.	23	583
Upper Monroe:		
As at 560	17	610
As at 560, but slower eff	10	520
Like 560 in color, but with many large pieces of gypsum, and slow eff	30	650
The same, with a certain amount of gypsum	50	700
Brown; slow eff., except a few grains; some gypsum	20	720
Dark buff; slow eff., gypsum	40	760
Dark gray, slow eff., gypsum	25	785
Dark gray; gypsum; eff. faster at 890 ft. than at 900 ft., quartz occasional	105	890
Dark brown; with a trace of gypsum	10	900
Like No. 720 in color; moderate eff.; occasional quartz; trace of gypsum	20	920
Brownish buff; quick eff.; a little quartz, chert and clay	20	940
Like 940, but a shade lighter	25	965
Sylvania sandstone:		
Granular white sandstone, very pure; rounded grains averaging 0.3 mm. in size, and smaller angular grains, averaging 0.15 mm. in diameter, like the sand at 1920 ft. and 1950 ft. at Kalamazoo	35	1000
Unrecorded	60	1060

NEW BALTIMORE WELL.

C. M. Swift, owner. Drillers, J. J. Mason & Co.

Elevation about 588 (?) ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Surface	120	120
Antrim shale:		
Blue shale	5	125
Black shale	335	460
Compare St. Clair, 400; Marine City, 460; Pontiac, 965; Mt. Clemens, 218.		
Traverse Formation:		
Limestone and calcareous shales	20	480
Limestone	50	530
Compare St. Clair, 630; Pontiac, 1065.		
Blue shale	160	690
Compare St. Clair, 790; Algonac, 513; Marine City, 740 to 635; Pontiac, 1235; Mt. Clemens, 400.		
Dundee (Corniferous) limestone:		
Limestone high grade	130	820
Compare St. Clair, 910; Marine City, 825 to 770; Mt. Clemens, 610.		
Monroe Group, including Salina:		
Dolomites	290	1110
Gypsum bed (anhydrite) 860 to 870 ft.		
Compare St. Clair, 990.		
Gypsum bed 885 to 895 ft.		
Brown dolomite, 920 to 940 ft.		
Compare Marine City, 1060 ft.		
Limestones	165	1275
Compare St. Clair, 1380; Marine City, 1220.		
Brown dolomite and gypsum	85	1360
Blue dolomite, shale and gypsum	35	1395
Compare St. Clair, 1480; Marine City, 1390.		
Buff dolomite	50	1445
Blue and brown dolomite and gypsum	155	1600
Compare St. Clair, 1600; Marine City, 1604.		
Salt	40	1640

ROMEO WELL.

Loc.: Near water works? Mat Porter, contractor. Record from F. E. Hipp.

Elevation about 75 feet above R. R. station.	Thickness, feet.	Depth, feet.
Pleistocene or drift:		
Sand and gravel	150	.....
Coldwater shales (probably Antrim and Traverse in lower part):		
Very light rock, floats	30	180
Freestone, i. e., sandstone (Richmondville?)	60	240
"Soapstone," black shale and slate	510	750
Bed of rock salt (?) and well caves badly at 750, Berea horizon?		
"Soapstone," black shale and slate	300	1050
Dundee? (Corniferous) limestone:		
Sandstone or grindstone rock, like the Huron county rock, only it has harder streaks in it. (This may very likely be the cherty Corniferous limestone.—Lane)	250	1300
Monroe?:		
Limestone, light gray	70	1370
Soft rock; rotten limestone; caves badly.		
Plaster beds at 1370 ft.		
End of 4½ in. hole at 1420 ft.		
Gas veins and rock badly caving at 1440 ft.		
End of drill in soft rock at 1575 ft.		

ALGONAC WELL.

Loc.: South of Algonac on St. Clair river. Albert Miller, owner. Drilled in 1886. Driller's record. (Apparently this is one of the Algonac Salt Co.'s wells. See map.)

Elevation about 584 ft.	Thickness, feet.	Depth, feet.
Pleistocene:		
Surface, clay, etc.	208	208
Traverse or Hamilton:		
Soft white shale	85	293
Soft brown lime	20	313
Soapstone, soft, gray and sticky	200	513
Dundee and Monroe, not separated:		
Hard, mixed gray and brown limestone. (The records of this well do not show the distinction between limestone and dolomite)	767	1280
Yellow gypsum (probably anhydrite), 1180-1185 ft.		
Hard, mixed gray and brown limestone	20	1300
Blue shale; medium hard	75	1375
Salina:		
Gray, brown and white hard limestone	125	1500
Rock salt.		
Shale and salt mixed; soft and hard	80	1580
Hard brown and white lime	25	1605
Rock salt	18	1623
Hard gray lime	10	1633
Salt	94	1727
Hard limestone at 1727 ft.		

LESTER AND ROBERTS WELL.

Record from samples preserved by J. R. Burr. Driller, Mathew Porter. Record by C. E. Wright.

Elevation about 600 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Surface	50	50
Clay	150	200
Antrim:		
Hard pan, contains fragments of slate	20	220
Hard pan	10	230
Black bituminous slate, contains FeS_2	70	300
Dark and light drab slate	20	320
Black bituminous slate, contains small pieces of coal	20	340
Dark drab bituminous shale, contains small pieces of coal and FeS_2	10	350
Drab bituminous shale, somewhat calcareous	10	360
Traverse (Hamilton) Formation:		
Argillaceous dolomitic limestone	50	410
Al_2O_3 14.29.		
SiO_2 28.67.		
Light bluish gray to drab colored limestone	40	450
Light gray limestone	20	470
Light gray limestone, contains a little talc and slate	20	490
Light and dark gray limestone; small silicious residue	10	500
Soft argillaceous limestone (soapstone)	50	550
Al_2O_3 9.70.		
SiO_2 21.		

Elevation about 600 ft. A. T.	Thickness, feet.	Depth, feet.
Dark drab limestone	10	560
Calcareous argillaceous rock, gritless	75	635
Al_2O_3 17.18.		
SiO_2 41.30.		
Dundee (Corniferous) limestone:		
Light yellowish gray limestone	95	730
Light gray limestone, contains oblong concretions or possibly fossils, 5 mm	40	770
Upper Monroe or Detroit River Series:		
Dolomite, contains yellow specks	30	800
Light brownish drab dolomite; contains in residue a little anhydrite in white specks	30	830
Light gray dolomite; contains in residue a little anhydrite in white specks	25	855
Dolomite, light drab, contains in residue a little anhydrite in white specks	25	880
Hard dolomitic limestone, light gray, massive	25	905
Dolomitic limestone, contains a little anhydrite; also a few fragments of slate	30	935
Dolomitic limestone, contains a few fragments of slate	30	965
Dolomitic limestone, light drab, contains in residue a little anhydrite in specks	15	980
Dolomitic limestone, drab; even texture	10	990
Dolomitic limestone, dark drab	70	1060
Sylvania or Middle Monroe:		
Arenaceous limestone, dissolves briskly but leaves a large cherty sandy residue. Not organic	40	1100
Arenaceous limestone	30	1130
Lower Monroe or Bass Island Series:		
Limestone, light drab	30	1160
Limestone, light gray, contains a little gypsum	30	1190
Limestone, light gray, contains a little gypsum	30	1220
Dolomitic limestone, dark drab	5	1225
Dolomitic limestone, hard, light gray, yellow specks; large silicious residue	20	1245
Dolomitic limestone, very dark drab; large silicious residue	35	1270
Dolomitic limestone, light drab; small silicious residue	23	1293
Gypsum, drab and white	11	1304
Calcareous gypsum, dark drab; large residue, possibly argillaceous	26	1330
Calcareous gypsum, dark drab; very large residue, possibly argillaceous. $Si\ O_2$=12.68.	35	1365
Calcareous gypsum, dark drab; large residue, possibly argillaceous; contains anhydrite	25	1390
Dolomitic limestone, light and dark drab; large residue slate, anhydrite, gypsum and silica and some organic matter	15	1405
Dolomitic limestone, light drab; large residue slate, anhydrite, gypsum and silica and some organic matter	20	1425
Dolomitic limestone, light and dark drab; large residue slate, anhydrite, gypsum	20	1445
Dolomitic limestone, light drab, residue slate, anhydrite, silica and some organic matter	20	1465
Dolomitic limestone, light drab; large residue of gypsum	20	1485
Gypseous limestone, light drab; large residue of gypsum	20	1505
Gypseous limestone, light drab; large residue of gypsum	33	1538
Calcareous clay. Al_2O_3 22.12	41	1579
Anhydrite. SO_3 59.42	20	1599
Gypsum, (anhydrite) white and dark drab	5	1604
Salina:		
Rock salt	33	1637
Gypseous limestone. $S\ O_3$=14.10 (The gypsum is anhydrite.—Lane.)	4	1641

NATIONAL SALT COMPANY WELL.

Loc.: Marine City. Drilled in 1886. Record by C. E. Wright from driller's notes and samples.

Elevation about 600 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Earth	150	150
Gravel	50	200
Antrim shale:		
Dark brown and black shale	200	400
Traverse (Hamilton) formation:		
Light gray limestone, with small amount of sand and gypsum, or anhydrite	75	475
Calcareous clay shale	95	570
Hard light drab shale	15	585
Calcareous clay shale	40	625
Dundee (Corniferous):		
Gypsum, argillaceous limestone	40	665
At 665 ft. struck some calcareous tufa that floated to the surface and when dry was fluffy.		
Light gray gypseous limestone, resembles sand	35	700
Hard grayish white limestone	25	725
Brown and white limestone mixed with small amount of gypsum and sand	25	750
Brine at 750 ft.		
Upper Monroe, or Detroit River Series:		
Brownish gray dolomitic marl with small residue of silica	60	810
Dolomitic drab limestone	10	820
Grayish white calcareous anhydrite	30	850
Drab dolomitic gypsum marl	10	860
Dolomitic gypseous marl	10	870
Dolomitic limestone	10	880
Light gray and drab dolomitic limestone	90	970
Dolomitic limestone, yellowish to buff	30	1000
Sylvania:		
Dark ochreous, sandy limestone, large residue of silica and flint	130	1130
Lower Monroe, or Bass Island Series:		
Buff dolomitic limestone	60	1190
Light gray dolomitic limestone, with residue of gypsum, anhydrite and silica	30	1220
Bluish gray dolomitic limestone with small residue of gypsum and angular grains of black flint	40	1270
Bluish gray dolomitic limestone, with large residue of gypsum, anhydrite and flint	60	1330
Buff sandy dolomitic limestone, with large residue of silica, anhydrite and gypsum	20	1350
Light bluish gray calcareous gypsum, large residue of gypsum and anhydrite	50	1400
Gray mottled with yellow dolomitic limestone	30	1430
Bluish gray dolomitic limestone, large residue of light and dark gypsum and anhydrite	20	1450
Gray dolomitic limestone, with small residue of gypsum, anhydrite and silica	60	1510
Dark drab gypseous limestone, large residue of clayey gypsum	10	1520
Grayish calcareous clay, with large muddy residue	30	1550
Dark drab dolomitic limestone, small residue of gypsum	10	1560
Dark drab dolomitic limestone, large residue of gypsum	10	1570
Salina:		
Rock salt. Oil and salt at 1577 ft	20	1590
Dolomitic limestone, small residue of gypsum and anhydrite	10	1600
Rock salt	30	1630

W. B. MORLEY WELL.

Loc.: One mile north of Marine City. Drilled in 1886. Record from samples.

Elevation about 600 ft.	Thickness, feet.	Depth, feet.
Pleistocene, or drift:		
Clay	150	150
Gravel	5	155
Clay	30	185
Hardpan (clay or shale)	45	230
Antrim shale:		
Brown shale	70	300
Black shale	160	460
Brown calcareous shale	5	465
Traverse (Hamilton) Formation:		
Hard silicious gray limestone	45	510
Light gray calcareous clay shale, large clayey residue	145	655
Light gray calcareous clay	95	740
Dundee (Corniferous) limestone:		
Light gray limestone, small silicious residue	50	790
Hard light gray limestone, small silicious residue	15	805
Gas and mineral water at 805 feet.		
Hard light gray limestone, small silicious residue	10	815
Soft light gray argillaceous limestone	10	825
Upper Monroe, or Detroit River Series:		
Buff gypseous limestone, large residue of gypsum and anhydrite	55	880
Soft light gray limestone, small residue	20	900
Soft light gray limestone, small residue of anhydrite	30	930
Hard gray dolomite, small residue of black cherty quartz	65	995
Hard dark gray dolomite, small residue	15	1010
Grayish drab dolomite, medium residue of anhydrite and black grains of shale	55	1065
Sylvania (Middle Monroe):		
Dark buff sandy limestone, large residue of sand, 37 per cent of SiO_2	25	1090
Dark buff calcareous sandstone, 69.34 per cent SiO_2, milk white and glassy	35	1125
Dark buff sandy limestone, 16.4 per cent SiO_2	55	1180
Dark buff sandy limestone, 43.5 per cent SiO_2	27	1207
Lower Monroe, or Bass Island Series:		
Chocolate buff dolomite, medium residue of silica	93	1300
Soft grayish drab dolomite, medium residue of silica	10	1310
Dark drab to yellow gypseous dolomite, large residue of silica, gypsum and anhydrite	30	1340
Light gray and yellow gypseous dolomite, large residue of gypsum and anhydrite	20	1360
Gray calcareous gypsum, large residue of gypsum and some clay	100	1460
Gray dolomite, small residue of silica and gypsum	10	1470

MICHIGAN SALT WORKS WELL NO. 2.

Loc.: At plant south of Marine City. Drilled in 1898. Log furnished by Mr. S. R. McLouth.

	Thickness, feet.	Depth, feet.
Pleistocene drift:		
Clay	150	150
Hardpan	15	165
Clay and gravel	35	200
Antrim shale:		
Black slate	200	400
Traverse (Hamilton) Formation:		
Lime	15	415
Soapstone. Hard to mill. Could cut about 4 ft. per hour with 4 inch stem 43 feet long	50	465
Darker and harder	110	575
Lime. (Dundee?) Average 2 ft. per hour with 5⅛ inch stem, 38 ft. long. Struck sulphur water at 710 and salt water at 725 ft	155	730
Brownish limestone. Soft. Easy on bits	50	780
Dundee and Upper Monroe:		
(?)	15	795
Streaks of gypsum	5	800
Hard streak of lime	25	825
Gypsum	5	830
Hard	20	850
Gypsum	10	860
(?)	10	870
Hard streak of lime	5	875
Soft blue gypsum	25	900
Limestone shelly	70	970
Averaged 15 inches per hour	30	1000
Flint limestone. Good drilling. 18 ft. in 12 hours	40	1040
Same	60	1100
Sylvania:		
Sandy limestone. Very hard	60	1160
Lower Monroe:		
Hard; 8 in per hour from 1160 to 1225 ft	140	1300
Caving rock and gypsum	70	1370
No trace of gypsum from 1370 to 1400 ft	30	1400
Very hard	100	1500
Same	70	1570
Salina:		
Salt, first bed	25	1595
Lime and (?) salt. (The record at this point is not clear, reading "10 ft. lime and 10 ft. of salt to 1605. Lime to 1612 ft.; lime 11 ft.")	10	1605
Lime	7	1612
Lime	11	1623
Salt; top of lower bed at 1623 ft	128	1751
Lime at 1751 ft.		

DIAMOND CRYSTAL SALT CO. WELL.

Loc.: Near plant. St. Clair. One of the older wells, drilled prior to 1901. Record from samples by A. C. Lane.

	Thickness, feet.	Depth, feet.
Pleistocene:		
Surface	172	172
Antrim shale:		
Blue shale (Erie)	110	310
Black shale (Huron)	220	530
Compare Marysville, 298 ft., Marine City, 360 ft., Oakland, 840 ft., and New Baltimore, 400-460 ft.		
Traverse (Hamilton) Formation:		
Blue argillaceous limestones and dolomites, etc	100	630
Blue shale	160	790
Compare Marysville, 588 ft., Marine City, 630 ft., Oakland, 800 ft., Mich. Salt Co. No. 2, 575 ft. and New Baltimore, 695 ft.		
Dundee (Corniferous) limestone:		
Limestone	120	910
Compare New Baltimore, 820 ft.		
Monroe Formation:		
Dolomites	80	990
Compare Marine City, 800 ft.		
Gypsum and dolomite	40	1030
Compare Marysville, 345 ft., New Baltimore, 860-920 ft.		
Dolomite probably sandy about 1270 ft	1270	.....
Offset through Sylvania sandstone	240	1370
Compare New Baltimore, 1370 ft.		
Dolomite	80	1450
Anhydrite largely	50	1500
Dolomite	40	1540
Dolomite	70	1610
New Baltimore, 1600 ft., Marine City, 1577-1633 ft., and No. 3, 1668 feet.		
Salina:		
Salt and cavity	30	1640
Lime	10	1650
Dolomite and anhydrite	97	1747
Salt	50	1797
Lime (?)	10	1807

DIAMOND CRYSTAL SALT CO. WELLS NOS. 6 AND 7.

Loc.: St. Clair. Composite record[10] of wells Nos. 6 and 7 from driller's log. Started, Feb. 10, 1909. Record furnished by Mr. F. W. Moore.

	Thickness, feet.	Depth, feet.
Pleistocene drift:		
Clay	115	115
Hardpan and gravel	38	153
Antrim shale:		
Blue shale or slate	52	305
Brown shale	195	500
Traverse (Hamilton) Formation:		
Lime	12	512
Blue shale	10	522
Lime	20	542
Blue shale	23	565
Lime	25	590
Soapstone	110	700
Lime	10	710
Soapstone	50	760
Dundee (Corniferous) and Upper Monroe:		
Lime	60	820
Sharp hard lime	10	830
Lime. In part Dundee	290	1120
Hard brown lime	8	1128
Lime	32	1160
Sylvania:		
Hard sandy lime	20	1180
Very hard lime	20	1200
Very sharp lime	145	1345
Lower Monroe:		
Lime	55	1400
Very hard lime	85	1485
Mud vein	5	1490
Red shale	5	1495
Lime	75	1570
Hard brown lime	30	1600
Hard gray lime	20	1620
Salina (First salt at 1630 in No. 5, 1620 in No. 6, and 1623 in No. 7):		
Salt	33	1653
Lime	22	1675
Hard brown lime	10	1685
Lime	20	1705
Very hard lime	38	1743
Salt	20	1763
Lime	5	1768
Salt	10	1778
Shale	76	1854
Salt	30	1884
Lime	8	1892
Salt	10	1902
Lime	10	1912
Salt	8	2020
Lime	5	2025
Salt	105	2130
Lime	5	2135
Salt	30	2165
Brown lime	35	2200

[10]The record of the No. 7 well was not saved until after the first salt bed was reached at 1623 ft., compared with 1620 in No. 6. From the top of the first salt, the record of the No. 7 well is used since it passed through the last salt bed whereas the No. 6 well did not.

WALLACEBURG WELL.

Elevation about 585 (?) ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Sands and clays	35	35
Boulder clay	85	120
Shale	180	300
Limestones	75	375
Shale and sandstone	74	449
Compare Marine City, 370-480 ft.		
Traverse (Hamilton) Formation:		
Limestone, "top limestone"	106	555
Compare Marine City, 600 ft.		
Shale, "top soapstone"	95	650
Compare Marine City, 640 ft.		
Limestone, "middle limestone"	15	665
Compare Marine City, 730 ft.		
Shale, limestone and clay	85	750
Dundee (Corniferous) limestone (Top of Monroe not separated):		
Light colored limestone	250	1000
Doubtless the lower part is dolomite and belongs to the Upper Monroe.		
Sylvania (Middle Monroe):		
Sandstone	100	1100
Lower Monroe:		
Fine grained dolomites	280	1380
Gypsiferous dolomites	320	1700
(No salt reported, the record may be imperfect.)		
Niagara (Guelph and Lockport):		
Dolomites	120	1820
Limestone	105	1925
Oil at 1865 ft.		
Calcareous and arenaceous shales	110	2035
Medina:		
Gray sandstone, red shale and marls	65	2100

NORTH BAY CITY WELL.

Loc.: Near Atlantic Mill, North Bay City. Drilled in 1885-6 by John Mason. Record by Lane from notes of C. E. Wright and from record published by Bay City Tribune.

Elevation 592 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Sand and clay	85	85
Hard pan	35	120
Saginaw Coal Measures:		
Blue shale	300	420
Sandy shale	145	565
Parma:		
Limerock to brine 85°. Carboniferous limestone (?)	20	585
Sand rock; brine 45 ft. to 55 ft	50	635
Grand Rapids Group:		
Sandy shale	25	660
Blue shale	40	700
Gypsum; white; 6 in. casing to 722 ft	12	712
Blue shale	108	820
Hard limerock	10	830
Napoleon or upper Marshall:		
Sandstone; brine to 100°	90	920
Lower Marshall:		
White shale	35	955
Red shale	100	1055
Coldwater:		
Blue shale	50	1105
Limestone	40	1145
Hard blue shale	75	1220
Blue limestone (Calcareous shale?)	65	1285
White shale	105	1390
Sand shale	120	1510
Blue shale	20	1530
Hard limestone (Concretion?)	18	1548
Blue shale	200	1748
White shale	50	1798
Black shale	35	1833
Black limestone	65	1898
Brine bearing sandstone	15	1913
White shale	70	1983
Hard limestone	50	2033
Sunbury or Berea shale:		
Soft black sand	15	2048
Hard blue shale at 2067 ft	45	2093
Black oily shale, 15-20 ft. thick at 2085 ft.		
Very hard limestone; 5 5-8 in. bore to 2120 and 5 1-2 in. below	25	2118
Berea:		
Sandstone	15	2133
Gray limestone	8	2141
Pumped clean sand at 2140 ft.		
Sandrock with salt brine; 100°, overflowing top	165	2306
(2252½ ft. deep, stopped in blue shale.—Wright).		
Antrim shale:		
White shale	65	2371
Black oily sandy shale	214	2585
Traverse (Hamilton) Formation:		
Black hard limestone	100	2685
Gray limerock	90	2775
Blue shale, quite hard	47	2822
Sandy limestone	30	2852
Limerock	13	2865

NORTH AMERICAN CHEMICAL COMPANY WELL.

Loc.: South Bay City, sec. 5, T. 13 N, R. 5. E. Drilled by Thos. Percy.

Elevation 585 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Sand	15	15
Clay with thin seams of sand	35	50
Sand	10	60
Hardpan	10	70
Sand	30	100
Saginaw Formation:		
Shale	38	138
Quicksand, probably fissure	2	140
Sandstone	138	278
Blue shale	17	295
Sandy shale	10	305
Blue shale	15	320
Sandy shale	5	325
Blue shale	35	360
Shale	60	420
Fire clay	10	430
Blue shale	30	460
Fire clay	10	470
Shale	10	480
Red shale	10	490
Parma Conglomerate:		
Sandstone	50	540
Upper Grand Rapids, Maxville or Bayport:		
Brown dolomite	30	560
Silicious dolomite	60	610
Sandstone	10	620
Lower Grand Rapids or Michigan Series:		
Dolomite	5	625
Gray shale	25	650
Dolomite	10	660
Gray shale	35	695
Sandy dolomite	25	720
Green shale	10	730
Gray shale	10	740
Limestone	10	750
Gray shale	20	770
Limestone	10	780
Gypsum	10	790
Gray limestone	30	820
Upper Marshall or Napoleon Sandstone:		
Gray sandstone, brine	150	970
Analyzed. Usual temperature of brines 60.4° F.		
Lower Marshall:		
Red sandstone	100	1070
Blue shale	30	1100
Red shale	20	1120
Red sandstone	20	1140
Blue shale	45	1185
Red shale	5	1190
Coldwater shale:		
Blue shale	560	1750
At 1304 ft. 65° F; at 1793 ft. 71° F.		
Dark blue shale	100	1850
Blue shale	70	1920
Red shale	20	1940
Blue shale	10	1950
Sandy shale	10	1960
Blue shale	100	2060
Sunbury (Berea) shale:		
Black shale	40	2100
Berea grit:		
Gray sandrock	40	2140
White sandrock, strong brine flowing over surface at 2170 ft. Flow about 20 gal. per hour at 2230 ft	130	2270

NORTH AMERICAN CHEMICAL COMPANY WELL.—Concluded.

Elevation 585 ft. A. T.	Thickness, feet.	Depth, feet.
Antrim shale:		
Blue shale	20	2290
Black shale, oily, gas	14	2304
Rock salt (from precipitation?)	6	2310
Black shale, calcareous at 2380 and 2490 ft. (concretions?)	225	2535
Brown shale	15	2550
Black shale	60	2610
Oil and gas at 2580.		
Traverse Formation:		
Sandy limestone	10	2620
Sandstone	10	2630
Blue shale	60	2690
Limestone	10	2700
Blue shale	27	2727
Limestone	9	2736
Sandstone. Brine with indications of gas (between 2734-2740 ft.)	44	2780
Sandy limestone	30	2810
Brown sandy limestone	50	2860
Gray sandy limestone. Brine	45	2905
At 2934 ft. 90.1°-90.2° F.		
Pepper sandy limestone	35	2940
Blue shale	180	3120
Gray shaly limestone	40	3160
Blue shale	50	3210
Marcellus shale:		
Black shale	60	3270
Dundee limestone:		
Gray limestone (yellow limestone—Cooper.)	238	3508
At 3455 ft. 97° F.		

BLACKMAR WELL.

Loc.: Blackmar, Taymouth Twp., Saginaw County. Mr. Blackmar, owner.

Elevation about 613 ft. A. T.	Thickness, feet.	Depth, feet.
Drift	90	90
Shale	270	360
Coarse sandrock, brine 63° salinometer test	90	450
Blue shales	45	495
Red shales	200	695
Gray sandy shales	850	1545
Sandstone with a strong brine at 1675? (1545?) ft	110	1655
Gray shale	20	1675
Limestone	2	1677

FRANKLIN WELL.

Loc.: Kawkawlin, Bay County.

Elevation 596 ft. A. T.	Thickness, feet.	Depth, feet.
Drift	100	100
Saginaw Formation:		
Shale and sandrock with coal seams	300	400
Grand Rapids Group:		
Gypsum at 400 ft., limestone and gypsiferous shales	100	500
No record	200	700
Napoleon:		
Sandstone with a strong brine	100	800
Lower Marshall:		
Red shales	233	1133

FLINT WELL.

Reported by Dr. Clark.

Elevation 715 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Drift	68	68
Sandstone	67	135
Shales and sandstone with seams of coal	35	170
Marshall:		
Sandstone, with a strong stream of fresh water at 260 feet	108	278
Alternations of shale and sandstone; in the lower part strong brine (from Berea?)	922	1200

MIDLAND WELL.

Elevation 608 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Surface deposits	285	285
Coal Measures:		
Micaceous white sandstone, fresh water	33	318
Black soft shale	27	345
Sandstone, brine at 420 ft	65	420
Hard shale	35	455
Sandstone	70	525
Hard shale	50	575
Hard sandstone	7	582
Black shale	118	700
Calcareous ($FeCO_2$) shale	45	745
Black shale	65	810
Parma:		
White sandstone	110	920
Grand Rapids:		
Argillaceous limestone	50	970
Plaster bed, fairly pure anhydrite	80	1050
Calcareous shale	80	1130
Limestone	75	1205
Napoleon or Upper Marshall:		
White sandstone somewhat ferruginous	100	1305

ALMA WELL.

Loc.: Alma Sanitarium, 1889. Sec. 34, T. 14 N., R. 3 W. Reported by Prof. C. A. Davis, from samples.

Elevation about 755 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Clay and gravel with quicksand and water at 60 ft. and 3 ft. water-bearing gravel at 157 ft	475	475
Sand and gravel	25	500
Woodville?:		
Feldspathic sandstone (335-590 at St. Louis)	50	550
Coal Measures:		
Pyritiferous black shale, coal horizon	25	575
Blue shale	40	615
White shale	22	637
Pebbly sandstone	38	675
Shale sometimes black, coal reported	35	710
Parma sandstone:		
Pyritic sandstone, brine	80	790
Grand Rapids:		
Blue and black sandy shales	70	860
Blue and white gypsum	35	895
Bituminous, dolomitic red or blue argillaceous limestones (cement rock)	120	1015
Upper Marshall or Napoleon:		
Clean white sandstone, brine	85	1100
Lower Marshall:		
Red sandy shale	200	1300
Blue shale	20	1320
Red shales	180	1500
Coldwater:		
Blue shales	75	1575
Brownish fine grained grit, no water	30	1605
Black shales	35	1640
Light yellowish fine sand	40	1680
Dark shale colored limestone or shale	60	1740
Dark blue shale	510	2250
Berea shale:		
Black shale	50	2300
Berea absent?:		
Antrim (Ohio shale):		
Blue shale	60	2360
Black shale	260	2620
Black shale with harder streaks (limestone shells?) Sandy from 2630-2670 ft	130	2750
Traverse Formation:		
Dolomitic limestone	30	2780
Blue shale	20	2800
Sandy limestone, dolomitic	61	2861
Mineral water at 2825 ft. Temp. 98° F.; gas.		

ITHACA WELL.

Record by the Gratiot Journal.

	Thickness, feet.	Depth, feet.
Pleistocene or surface:		
Surface clay	10	10
Blue clay, stony	70	80
Hardpan	38	118
Gravel	1	119
Hardpan	30	149
Gravel. Considerable water	2	151
Hardpan	40	191
Gravel	4	195
Blue clay	6	201
Hardpan	10	211
Gravel	2	213
Red clay	60	273
Hardpan	4	277
White clay	25	302
Blue clay	8	310
Hardpan. Very hard	10	320
Gravel	5	325
Hardpan	5	330
Woodville (?) sandstone:		
Gray sandstone. Very hard. Bottom of 8-inch casing	2	332
Gray sandstone	4	336
Saginaw Coal Measures:		
Fireclay	3	339
Red sandstone	4	343
Red shale	2	345
Blue shale	4	349
Bottom of 7-inch casing, with two 16 foot lengths, standing up into 8-inch pipe, 15 ft. bagged and swedged out on top. Bottom of this casing is 349 ft. by measurement.		
Blue shale	6	355
Limerock	2	357
Sandstone	5	362
Blue shale	5	367
Dark lime	1	368
White shale	15	383
Black shale	16	399
Light shale	15	414
Blue shale	20	434
Dark lime	6	440
Light shale	22	462
Dark lime	8	470
Sandrock	8	478
Dark lime	2	480
Sandrock	2	482
Light shale	8	490
Sandrock	25	515
Light shale	10	525
Parma:		
Light sandstone	86	611
Grand Rapids Group(?):		
Light shale	2	613

MT. PLEASANT WELL.

(Mt. Pleasant Village and Midland Chemical Company.)

Loc.: 0.65 miles N., 2 miles west of S. E. Cor. of sec. 10, T. 14 N., R. 4 W. Record from samples and notes of A. Borden.

Elevation about 707 (?) ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or drift:		
Gravel, glacial overwash	80	80
Blue till	20	100
Quicksand	20	120
Blue till	160	280
Porous bed with water, coarse gravel on top, fine sand below	74	354
Red clay	26	380
Ground moraine, till with broken coal measures	55	435
Saginaw Coal Measures:		
Black shale with streaks of coal (410,435, 560 ft.), sandstone, limestone or carbonate of iron and fire clay, mostly less than five ft. thick	185	620
Fine white sandrock with mineral water	90	710
Gravelly sandrock, with a strong flow of water not so salt	80	790
Shale and red limestone	30	820
White limestone	30	850
Parma:		
White sandstone with very salt water	120	970
Maxville:		
White limestone, fiercely effervescing	55	1025
Shale	5	1030
Sandstone	20	1050
Michigan Series:		
Dolomite and shale	75	1125
Anhydrite and dolomite	100	1225
Anhydrite, nearly pure (gypsum)	45	1270
Dolomite, shale and anhydrite (gypsum)	103	1373
Sandstone	8	1381
Shale	5	1386
Sandstone	4	1390
Shale	15	1405
Napoleon:		
Sandstone, dark, with heavy brine	145 +	1550 +
Lower Marshall, 1550 + ft.:		
Red rock; well originally 1463 ft. deep, afterwards deepened to be between 1550 ft. and 1585 ft., ending in red rock.		

W. F. BRAUN WELL.

Loc.: On Riley farm, Mt. Pleasant, Mich., W. ½, N. W. ¼ of sec. 27, T. 14 N., R. 4 W. Driller's record to 3082 ft. Record supplemented by samples below this point.

Elevation given as 800 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Sand loam	2	2
Quicksand and water	16	18
Clay	32	50
Sand and water	8	58
Clay	2	60
Sandy clay	15	75
Quicksand vein, good water	1	76
Sandy clay	13	89
Quicksand	1	90
Sandy clay	10	100
Quicksand	10	110
Gravel	15	125
Gravel and quicksand	47	172
Blue fire clay	45	217
Gravel	5	222
Blue "fire clay"	60	282
Red "sand rock" (boulder?)	10	292
"Fire clay," blue	10	302
Red sand rock (boulder?)	27	329
"Fire clay," pinkish color	41	370
Quicksand and water	5	380
Red "fire clay"	10	390
Gravelly sand	10	400
Saginaw Coal Measures:		
Limestone	5	405
Red sand rock, hard	40	445
Fresh soft water	5	450
Sand rock red	3	453
Black slate (shale)	10	463
Gray sand rock	10	473
Black fire clay	4	477
Gray sand rock	31	508
Black shale	25	533
Gray shaly limestone	10	543
Black shale	124	667
Pure white sand, fresh water	55	722
Red shale	30	752
White soapstone	24	776
Gray limestone	26	802
White shales	9	811
Parma:		
Pure gray salt sand, much brine	124	935
Maxville or Bay Port:		
Limestone gray, very hard	45	980
Mixed limestone, pebbly and sandy	35	1018
Michigan Series:		
Salt blue (shale?)	3	1021
Mixed limestone	6	1027
Blue shale	11	1038
Mixed rock, blue shale and limestone	32	1070
Mixed rock gypsum and clay	35	1105
Gray limestone	10	1115
Blue shale	35	1150
Black shale	10	1160
Gray limestone	10	1170
White limestone	24	1194
Blue shale	6	1200
White limestone	15	1215
Blue shale	25	1240
Gray limestone, very hard	25	1265
Mixed limestone of rock and shale	35	1300
Gray limestone	10	1310
Blue shale	10	1320
Limestone, very hard	10	1330
Blue shale	10	1340
Fine gray sand (top of the Upper Marshall?)	60	1400
Gray limestone	38	1438

Elevation given as 800 ft. A. T.	Thickness, feet.	Depth, feet.
Upper Marshall or Napoleon:		
Salt sand, gas, sand top; much salt water, 1535 ft. of 8¼ in casing	69	1507
Lower Marshall:		
Red sand rock	75	1582
Coldwater:		
Blue shale	716	2298
Gray shell (carbonate nodule?)	2	2300
Blue shale	15	2315
Gray shell (carbonate nodule?)	3	2318
Blue shale	232	2550
Sunbury shale:		
Brown shale	18	2568
Limestone	4	2572
Brown shale	6	2578
Berea (?) horizon:		
Black sand and shale, showing oil and gas; oil of Sp. gravity of 47°, at 2590 ft	20	2598
Antrim shale:		
White shale	18	2616
Brown shale	40	2656
Black shale	20	2676
Black sand and shale small show of oil; hole reduced to 6½ inches	6	2682
Black shale	233	2915
Black sand, mixed with black shale; mineral ore showing silver (?) and iron ore	13	2928
Black shale	54	2982
Black sand, mixed with black shale, showing mineral ore, silver (?) and iron	13	2995
Black shale, mixed with limestone	15	3010
Black shale	72	3082
Traverse (Hamilton) Formation:		
Salt and pepper limestone; mod. eff. Very little chert. Some particles of black shale from above at 3082.		
Light grayish buff limestone	2	3084
Buff gray limestone, mod. eff. Slightly cherty	2	3086
Grayish buff limestone, pyritic, a little chert; briskly eff	2	3088
Gray limestone, briskly eff	5	3093
Dark buff gray limestone, mod. eff	6	3099
White and dark gray limestone, pyritic; vigorously eff. Some dark gray shale; *calcite* crystals	6	3105
White crystalline limestone and very calcareous shale; some pyrite; vigorously eff	6	3111
Very calcareous blue shale	17	3128
Light gray to dark gray limestone; brisk eff.; calcite fragments	15	3143
Light gray limestone and dark gray shale; brisk eff	7	3150
White to light gray limestone; brisk eff	7	3157
Yellowish gray limestone; violent eff	13	3170
Very cherty white limestone	18	3188
Very cherty fossiliferous (coral, acervularia?) limestone; blue and black shale; violent eff	6	3194
Very cherty fossiliferous (coral) light gray limestone; violent eff.; some blue shale	6	3200
Very cherty light gray limestone, pyritic with some blue shale	6	3206
Very fine white cherty limestone; violent eff	4	3208
Cherty white crystalline limestone; violent eff	2	3210
Yellowish white and very cherty limestone; violent eff	2	3212
White to light gray cherty limestone; violent eff	6	3218
Very cherty white fossiliferous limestone; violent eff	12	3230
Fine grained cherty white limestone; violent eff	4	3234
Buff gray limestone; violent eff.; some dark shale	6	3240
White to light gray cherty limestone; very hard; violent eff	5	3245
Same	15	3260
Light gray limestone; violent eff	16	3276
White limestone; violent eff	20	3296
Light gray with some black limestone and dark gray shale; violent eff	4	3300
Light and dark limestone (''salt and pepper''); violent eff.; some gray shale	6	3306
Dark gray limestone	6	3312

Elevation about 800 ft. A. T.	Thickness, feet.	Depth, feet.
Traverse (Hamilton) formation:		
Gray limestone, violent eff	25	3337
Salt and pepper limestone	13	3350
Buff white limestone mixed with some shale	25	3375
Buff gray limestone	9	3384
Light limestone and dark to black shaly limestone	4	3388
Gray limestone mixed with some light limestone	12	3400
White and gray limestone; violent eff	15	3415
Buff gray limestone mixed with some dark; violent eff	12	3427
Hard white to light gray limestone; violent eff	3	3430
White limestone mixed with gray	42	3472
Salt and pepper limestone	8	3480
Gray shale mixed with limestone at 3480.		
Calcareous gray shale	24	3504
Very calcareous light gray shale	2	3506
Calcareous bluish gray shale	10	3516
Dark bluish gray shale mixed with light gray limestone	6	3522
Dark bluish gray shale	11	3533
Calcareous gray shale and limestone	25	3558
Calcareous and fossiliferous gray shale	22	3580
Very dark gray, cherty and fossilferous limestone and dark calcareous shale	8	3588
Cherty limestone mixed with shale	10	3598
Bluish shaly limestone; some chert; very hard	22	3620
Dark buff gray limestone and black shale; mod. eff	47	3667
Dundee limestone:		
Very hard buff to dark gray limestone; cherty and very pyritous; mod. eff.	8	3675
Very hard, dark buff pyritous limestone; mod. eff	5	3680

So strong a flow of water was struck at 3675 ft. that drilling was stopped at 3680 ft. Temperature at bottom 104° F. Temperature gradient apparently one degree in about 67 ft.

McCLURE WELL.

Loc.: Near Gladwin. Chas. G. McClure, owner; drilled in 1913.

Elevation about (?) 790 ft. A. T.	Depth, feet.
Surface	600
Sand with water at 380 ft.	
Saginaw Coal Measures:	
Dark gray shale	600
Parma:	
Sandstone	650
Grand Rapids Group:	
Calcareous green shale	790
Dark gray shale with considerable gypsum	945
White sandstone with brine	950
Light gray limestone and shale	1020
Shaly limestone with gypsum	1030
Dark limy shale	1190
Gray shale with pyrite, gypsum and brine	1230
Napoleon at	1250
White sandstone, with some limestone fragments, pyrite and brine	1300
Lower Marshall:	
Red sandy shale	1350
Coldwater shales:	
Dark gray shales (1425 ft. to)	1675
Gray shales	2150
Richmondville? sandstone:	
Extremely fine grained light gray sandstone, somewhat calcareous, full of small black specks	2170
This sandstone resembles very closely some of the Berea found at Saginaw, but it appears to be too high for the Berea and may be one of the stray sandstones often found in the Coldwater shales at some distance above its base.	
Light gray shales (2205 ft. to)	2275
Dark gray shales but not bituminous at	2350
Antrim:	
Very black and bituminous shale at	2495
Light gray shale	2465
Brownish black bituminous shale (2525 ft. to)	2825
Light gray and brownish shale, mixed	2880
Both black and brown shale, more or less calcareous.	
Very pyritic black shale with some white chert fragments	2900
Very pyritic black shale with some white chert fragments	2940
Traverse (Hamilton) Formation:	
Top probably at about	2970
Light gray limestone with some black particles of shale, probably from the black shale above	2975?
A sample was missing between 2940 and 3025 ft. and this bottle without a label appears to be the missing sample which probably was taken not far from 2975 ft. The top of the Traverse, therefore, should be between 2940 and 2975 ft. and from the amount of black particles in the sample, the top may be nearer 2975 ft.	
Gray limestone fiercely effervescent	3025
Some particles of black shale in this sample, probably from above. These were also calcareous.	
Light gray limestone, fiercely effervescent, cherty and granular. The limestone breaks up into very fine particles	3035
Light gray limestone, fiercely effervescent, cherty and granular. The limestone breaks up into very fine particles	3040
Cherty light buff limestone, moderately effervescent	3043

Well afterwards deepened but amount unknown.

GRAND RAPIDS WELL.

Grand Rapids Artesian Well Co. Record by C. E. Wright.

Elevation between 605 and 639 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or Surface:		
Drift	10	10
Grand Rapids Group:		
Black clay slate	47	57
Plaster rock (gypsum) mixed with clay slate	71	128
Marshall Sandstone:		
Sandstone, dark and light colored	17	145
Sandstone, light gray. Fresh water, increases with depth	95	240
Lower Marshall:		
Hard black coarse sandstone. Increase of fresh water	19	259
Blue clay slate	12	271
Ash-colored sandstone, mixed with clay seams and layers of soapstone; fine texture. Small quantity of weak brine, 20°	129	400
Coldwater shale:		
Sandy shale at top and clay-rock boulders and sheets below	20	420
Light blue to ash-colored shale, with very little change in color except for short places which are little darker. Quite uniform as to hardness. Except these (?), the lower 250 ft. has more hard streaks, and boulders that would make slate pencils	735	1155
Dark hard water-lime from 702 to 712 ft. There is a streak of ten feet from 712 to 722 ft. of calcareous water-lime, dark and hard at top and softer below; but it is all hard rock.		
Dark red clay, soft	20	1175
Sandstone, (Richmondville?) brine 26°, small amount	30	1205
Light to greenish blue shale, mixed with clay rock. Streaks and boulders and streaks of gas-scented material	295	1500
Antrim shale:		
Black slate rock; scent of gas at top and stronger in depth and very strong at bottom	208	1708
Black slate or hard rock; strong odor of gas and oil	67	1775
Traverse (Hamilton) Formation:		
Drab limestone; color changes nearly every foot	52	1827
Drab magnesian limestone	28	1855
Very dark water-lime	10	1865
Each screw changes color	20	1885
Limestone; light gray and medium hard in upper portion and dark drab and hard below	115	2200
Gas, marl, limestone and brine	20	2220

IONIA WELL.

Loc.: In vicinity of old sandstone quarries. Record by Mr Blanchard.

	Thickness, feet.	Depth, feet.
Saginaw Coal Measures:		
Sand rock	95	95
80 to 110 ft. in thickness.		
Shales and fire clay	4	99
Coal from 20 in. to 4 ft. at 99 ft.		
Fire clay	2	104
Sand rock, fine grained	40	144
Coal seam, thickness unknown		
Sandrock and shales alternating	306	450
"Copious stream of sweet water at 300 ft." Record not accurate in some places.		

ASSYRIA WELL.

Loc.: Sec. 9, Assyria Twp.

Elevation 917 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or Surface:		
Soil	2	2
Sand and gravel	38	40
Clay and gravel	15	55
Quicksand with water	7	62
Sandy clay	34	96
Fine sand, clay and gravel	34	130
Clay and gravel	32	162
Michigan Series:		
Limestone, light colored dolomite	1	163
Bluish shale and gypsum	77	240
Napoleon or Marshall:		
Clean white sandstone with water. Came within 100 ft. of top of well	70	310
Dark sandstone	10	320
Lower Marshall:		
Soft blue shale with "heavy black sand"	110	430
Calcareous shale and fine gray sandstone	20	450
Bluish shale, fine and sandy	50	500
Coldwater shale:		
Dark gray shale, very fine grained	575	1075
Typical Coldwater.		
First showing of oil at 560 ft. and water at 900 ft. Brown shale at 1075 ft. is iron carbonate.		
Dark green shale, calcareous	325	1400
Berea horizon:		
Red shale. Typical Bedford	50	1450
Antrim shale:		
Black and bituminous shale	18	1468
Dark blue shale	57	1525
Very black and bituminous shale, smell of gas	175	1700
Very black in part. Smell of gas or ammonia	55	1755
Pyritic and not as calcareous as above.		
Gray shale, hard and calcareous	15	1770
Very black and pyritic shale	40	1810
Traverse (Hamilton) Formation:		
Brown limestone fiercely effervescent	50	1860
Dark and shaly looking.		
Very black shale, very pyritic and quite calcareous. No water below 1875 ft	15	1875
Dundee (Corniferous) limestone:		
Buff limestone, fiercely effervescent	65	1940
Cherty limestone, brownish fiercely eff	35	1975
Pure white limestone, little or no chert, fiercely eff. Brine at 2000 ft., 93° salinometer test	35	2010
Dark brownish tending to drab limestone, fierce eff	15	2025
Light brown limestone; fiercely eff	5	2030
Dark gray limestone, some chert	10	2040
Very fiercely eff. limestone with much brown chert, a little pyrite and some clay at 2040 ft.		
Water at 2300 ft. Filled hole 600 ft. before cased off. No record of the lower part of drilling.		
Total depth	.....	2300 +

CHARLOTTE WELL.

E. Shepard and F. W. Higby. Driller's? record and notes on samples examined by A. C. Lane.

Elevation 906 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Rock	72	72
Woodville or Parma:		
"Fine sandrock." Mainly quartz sand, with a very little calcite and larger bits of dark bluish gray shale; water	88	160
Saginaw Coal Measures. (Perhaps in part Grand Rapids):		
"Fine shale." Quite dark bluish, with black specks (fossiliferous?), very finely divided quartz, much clayey matter and but a trace of calcite	210	370
Grand Rapids Group:		
"Fine sand rock." A somewhat sandy, medium gray shale; no reaction for gypsum; a trace of calcareous matter. There are some fragments very fine grained, but quite gritty	200	570
Upper Marshall or Napoleon:		
"Soft sand." Fine grained; quite calcareous; greenish gray sandstone, showing under the lens distinctly the rounded grains of colorless quartz. One larger piece shows distinctly the grayish or greenish white sandstone, with the rounded quartz sand and occasional specks of mica	110	680
Coldwater shale (Some of the top is probably Lower Marshall):		
"Shale and sand." Argillaceous limestone, with a little quartz and green earth; greenish gray	320	1000
Much like the preceding 320 ft.		
Calcareous shale, eff. briskly	150	1150
"Soft sand?" Much of the matter greenish gray argillaceous, as in previous samples, but there are also fragments of siderite or dolomite, often brownish. These may represent nodules of kidney iron ore	310	1460
"Sand and slate." Somewhat sandy limestone; contains some brown and white mica. (Richmondville?)	40	1500
"Soft slate." Calcareous shale with traces of quartz	160	1660
Berea (?):		
"Hard sand." Gritty calcareous shale. In the whole preceding section there is no distinct break	20	1680
"Red rock." Calcareous red shale; gritty; ferruginous	20	1700
Antrim shale:		
"Shale." Black shale, with occasional harder reddish fragments, barely calcareous	200	1900
"Shale." Brownish black bituminous shale, non-calcareous; burns with an aromatic smoke	30	1930
Traverse (Hamilton) Formation:		
"Shale." Shows frequent pyrite; black bituminous and gray grains, slightly calcareous	20	1950
"Shale." Gray calcareous shale with bits of calcite from fossils	30	1980
"Shale and lime." Highly fossiliferous shale full of bits of brachiopods(?) and of black matter	5	1985
Dundee (Corniferous) limestone:		
"Top of limestone." Gray limestone, briskly eff	15	2000
"Limestone." Brine at 2050 ft.; eff. briskly, with a cherty residue and a little quartz. All these limestones down to 2121 ft. are yellowish or buff ferruginous with magnetite	50	2050
Brine:		
Sp. g. 1. 198.		
Salin .97°.		
"Limestone." Eff. briskly	35	2085
"Limestone." Acid water in it. Eff. briskly: residue of cherty dolomite, quartz, magnetite and pyrite	15	2100
"Limestone;" hard water under it. Eff. briskly; residue of chert, quartz, green grains, with iron rust, magnetite and pyrite	2	2102
"Limestone;" like previous sample, residue larger	3	2105
"Limestone;" damp, reacts faintly from sulphates (gypsum), like previous sample	16	2121
"Limestone." Buff to gray, with little fragments of iron ore in thin seams (hematite; magnetic), but little quartz and no chert	29	2150
"Limestone." Buff to gray; slight residue of chert and quartz	59	2209

Driller's (?) record in quotation marks.

EATON RAPIDS OIL WELL.

Loc.: Smithville, Hamlin township, Eaton county. A. E. Smith, owner, Jno. Flanagan and J. A. Gardner, drillers. Samples by A. E. Smith.

Elevation about 900? ft. A. T.	Thickness, feet.	Depth, feet.
Samples missing to	.....	1510
Coldwater:		
Light gray shale	30	1540
Light gray shale, slightly gritty	30	1570
Light gray shale, non-calcareous	30	1600
Light gray shale	150	1750
Light gray shale, gritty	90	1840
Gray shale with red streaks	60	1900
Red and white shale (oxidized after exposure to air?)	80	1980
Berea at about 1975 ft.?:		
Antrim (Sunbury?):		
Pyritic black shale	10	1990
Sandstone (Berea?) conglomeratic, chert, feldspar, epidote?, magnetite, green and white quartz, limonite fragment, dark sandstone, fragments of black shale, calcite	5	1995
Black shale and limestone	10	2005

TABER WELL.

Record by W. D. Southworth.

Elevation about 860 ft. A. T.	Thickness, feet.	Depth, feet.
Coal Measures:		
Sandstone	75	75
Coal	2½	77½
Sandrock. Fresh water at 110 ft. in sandrock and large vein at 287 ft	222½	300
Michigan Series:		
Chalk rock	3	303
Shale. Mineral water at 385 feet	209	512

DELTA WELL.

Loc.: One mile south of Delta on Carrier Creek, sec. 10, Delta township, Eaton county. E. Hitchcock farm.

Elevation about 830 ft. A. T.	Thickness, feet.	Depth, feet.
Surface	40	40
No record. (Much white sandstone, some shale, with big flow of fresh water above 428 ft.)	.....	.....
Grand Rapids:		
Dolomitic sandstone similar to 875 ft. at	.....	544
No record. (Much sandstone and some shale)	196	740
Calcareous white sandstone	10	750
Dolomite and sandstone	10	760
Light gray shale, soft	5	765
Upper Marshall:		
Fine white sandstone	15	780
Much water (artesian) down to Coldwater.		
Fine grayish white dolomitic sandstone	50	830
Lower Marshall:		
Red sand and gray shale	5	835
Fine gray dolomitic sand	5	840
Very fine dolomitic sand	5	845
Very fine dolomitic sand, very sandy	10	855
Dolomitic gray limestone, slow eff. in cold HCl	10	865
White and very fine white sandy dolomite	25	890
Coldwater shale:		
Gray calcareous shale	10	900
Samples missing, probably blue and gray shales	300	1200
Gray shale, fossiliferous at	.....	1200
Samples missing, probably blue shale	575	1775
Mineral water from sandstone lens in the Coldwater, 10-15 bbls. per day.		
Gray dolomite	2	1777
Gray shale	73	1850
Extremely fine grained gray sandstone (Berea?), ferruginous with fine black specks similar to Saginaw Berea. Richmondville?	45	1895
Light gray calcareous shale	5	1900
Argillaceous dolomitic limestone, cherty	5	1905
Berea?:		
Red shale, calcareous	5	1910
Antrim shale:		
Dark gray shale	5	1915
Black and very bituminous shale at	.....	1950
Dundee limestone:		
Cherty shell at 2304 ft.:		
Buff or brown limestone, fiercely eff. Some chert, pyrite, and limonite fragments. (From pyrite?). Dundee very hard. According to Mr. Ricker the shell at 2304 ft. required 36 hours to penetrate. The artesian flow above 425 ft. was very strong and the water fresh, though there was a slight smell of "sulphur"	.....	2330

INDUSTRIAL SCHOOL WELL.

Loc.: At the School in the eastern part of Lansing.

Elevation about 840 ft. A. T.	Thickness, feet.	Depth, feet.
Clay and gravel	36	36
Sand and gravel	5	41
Sandy hardpan	4	45
Lake sand and gravel	39	84
Clay, sand and gravel	16	100
Lake sand and gravel	1	101
Coal Measures:		
Soft sand rock	3	104
Hard fire clay	4	108
Soft white sand rock	13	121
Soft sandy fire clay	15	136
Hard sand rock	119	255
101 to 255 is sandstone, "first water"—Winchell.		
Hard fire clay alternating with beds of sand rock, variable in color from whitish to blue	64	319
Cherty lime	1	320
Gray lime	4	324
Sandy fire clay mixed with seams of hard rock	51	375
Soft sand rock	37	412
Hard gray limestone	2	414
Soft white sand rock	15	429
Blue limestone	1	430
White fire clay	1	431
Sand rock	4	435
Fire clay with iron pyrites	50	485
Soft sand rock	5	490
Blue limestone	16½	506½

JACKSON WELL.

Loc.: Worthington & Cooley Mfg. Co. R. M. Decker & Co., drillers. Record from driller's log and samples.

Elevation 928 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or Surface:		
Quicksand and clay	22	22
Saginaw Coal Measures:		
Shelly sandstone	14	36
Black shale	10	46
Fine gravel (conglomerate)	5	51
Black shale (fireclay?)	32	83
Limestone	5	88
Grand Rapids Group?	.....	?
Marshall (Plus Parma at top?) sandstone:		
Mainly calcareous gray sandstone with minor amounts of argillaceous sandstone. Part of the bottom may be limestone or shale as shown in the other Jackson wells	285	373
Extra flow of water at 210 ft.		
Black shale	7	380
Blue sand	5	385
Dark shale and calcareous drab sandstone	30	415
Dark gray shale and blue sand (light gray to dark drab shale)	15	430
Dark gray shale and sandstone	15	445
Coldwater shale:		
Dark shales slightly calcareous at some horizons	215	660
Blue sandstone slightly calcareous	50	710
One foot of brown limestone at 665 ft.		
Dark gray clay shale	420	1130
Sandstone at 725 ft.		
One foot of limestone at 770 ft.		
Water commenced to flow at 1050 (?) ft. after nearly ceasing just before this depth.		
"Black" shale	208	1338
Some show of limestone at 1255 ft.		
Dark drab shale with 10 per cent brownish red at 1338 ft.		
Reddish brown shale	34	1372
Bituminous black shale (called coal)	3	1375
Dark gray and black (Sunbury) shale	25	1400
Berea Grit.		
Sandy shales	65	1465
Antrim Shale:		
Dark gray shale	10	1475
Bituminous black shale	135	1610
Very black shale at 1555 ft. with some smell of petroleum; also at 1570 feet.		
Blue shale	14	1624
Black shale	36	1660
Petroleum smell at 1655 ft.		
Brownish black calcareous shale	45	1705
Thin hard flinty shell at 1705 ft. Samples show bituminous black shale.		
Traverse (Hamilton) Formation:		
Dark gray calcareous shale	55	1760
Dundee (Corniferous) limestone:		
Limestone changeable in color; cherty or sandy. Brine at 1765 ft	82	1842
Very hard white shell at 1842 ft.		
Sandy limestone; "could run only 2 feet before sharpening; bitter water".	6	1848
Limestone calcareous and argillaceous; mainly gray in color, some yellow	19	1867
Calcareous blue shale	17	1884
Limestone gray, yellow or buff in color, often cherty or shaly	131	2015
Monroe Formation:		
Dolomite with anhydrite and gypsum with an abundance of marls of various colors. The marls are very salty, sometimes quite sandy and often with 10 to 20 per cent of gypsum or anhydrite	385	2400
Sandy dolomite	45	2445
Marls with chert, anhydrite with more or less salt and quite ferruginous; some gas	10	2455

JACKSON NO. 2 WELL.

Loc.: Woodworth's farm, north side of city. Driller's (?) (Fred Saeger) record, 1883.

	Thickness, feet.	Depth, feet.
Surface:		
Clay	6	6
Gravel	14	20
Saginaw Formation:		
Brown limestone (Grand Rapids Group?)	30	50
Fine clay	90	140
Marshall Formation:		
Sandrock	160	300
Coldwater shale:		
White shale	815	1115
Sandy shale, brackish. Brine	6	1121
White shale	289	1410
Berea?:		
Red shale	8	1418
Antrim shale:		
White shale	11	1429
Brown limestone	1	1430
Black shale	15	1445
White shale	52	1497
Sandy shale	15	1512
White shale	15	1527
Brown limestone	3	1530
Brown shale, contains gas	71	1601
Brown shale	99	1710
Black shale	20	1730
White lime	12	1742
Black shale	25	1767
Traverse Formation:		
White shale	40	1807
Sandy shale	10	1817
Dundee (Corniferous) limestone:		
Brown lime	228	2045
Monroe Formation:		
White shale (i. e. anhydrite—L.)	9	2054
Sandrock	15	2069
White shale	10	2079
Sandrock	12	2091
White shale	15	2106
Gray lime	2	2108
White shale	15	2123
Porous sandstone, salt rock	5	2128
White shale	15	2143
Gas rock	20	2163
White shale	10	2173

GOGUAC LAKE WELL NO. 6.

Loc.: At Goguac Lake near Battle Creek. Drilled in 1902 for Battle Creek Water Works by Sim Coleman. Size of pipe 8 inches. Record by W. F. Cooper.

Elevation 903 ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene or glacial drift:		
Lake sand and cement gravel	15	15
Fine lake sand	55	70
Dark sand and gravel with strong taste and smell of "sulphur"	10	80
Quicksand with some lake sand	118	198
Soft blue clay, with some coarse gravel with some streaks of light gray sand rock	10	208
Coldwater shale:		
Blue shale	198	407
At 287 ft. found indications of oil in dump from sand pump. Estimated one gill of oil to 10 gallons of dump.—Cooper.		
Hard gray sand rock	3	410
Soft blue shale	20	430

JACKSON WELL NO. 3.

Loc.: Francis and Milwaukee Sts. Driller's record. 1863.

	Thickness, feet.	Depth, feet.
Surface:		
Drift	5	5
Saginaw Coal Measures:		
Sandstone	60	65
Fire clay. Pronounced first class by gas-retort men	23	88
Marshall:		
Sandstone	203	291
Coldwater:		
Limestone	97	388
Slate	340	728
Saline from 685 ft. on increasingly.		
Salt water at 1040 ft. 20 per cent salt.		
Oil in traces at 1395 ft.		
Argillaceous slate at 1443 ft.		
Reached 1800 ft. on February 12, 1864.		
Reached 2000 ft. on June 4th, 1864.		
Bottom 2100 ft.		

FOWLERVILLE OIL WELL.

Loc.: Two miles south and 2 3-4 miles east of Fowlerville in N. E. ¼ of sec. 6, T. 3 N., R. 4 E. Henry White farm. 1903.

	Thickness, feet.	Depth, feet.
Pleistocene:		
Clay	30	30
Sand	8	38
Gravel	2	40
Sand	6	46
Blue clay	28	74
Sand	30	104
Gravel	2	106
Sand and gravel	22	128
Coal Measures:		
Sandrock	8	136
Blue shale with oil and gas, the flow being estimated at about one-half barrel per day	30	166
Dark sandstone at 157 ft.		

JASON-SHUMWAY WELL.

Loc.: Sec. 17, T. 4 N., R. 3 E., Grill Farm.

Elevation of well 900 ft. A. T.	Thickness, feet.	Depth, feet.
Surface to rock (8-in. drive pipe)	95	95
Slate (at 120 ft. oily at the house)	35	130
Shale (gas at 155 ft.)	63	193
Gray sand (dry well from 200-600 ft.)	25	218
Brown shale (gas at 380 and 600 ft.)	382	600
8-in. hole for 587 ft., cased at that depth with 5 7-8 in. casing.		
Coarse gritty sand with salt water (Berea?)	200	800
As analyzed, filled the well, and slowly oozed out in spite of a plug, with bubbles of fuel gas, and a temp. of 65%.		
Black shale	20	820
Brown shale	150	970

OWOSSO WELL.

Loc.: Four miles northeast of town. C. W. Collyer, 1863.

Elevation 745 ft. A. T.	Thickness, feet.	Depth, feet.
Surface:		
Gravel, sand, etc	94	94
Jackson Coal Series:		
Gravel and clay	6	100
Clay, mixed with sand and gravel	26	126
Shale	20	145
Coal	4	150
Shale	100	250
Parma sandstone:		
Sandrock	47	297
Sandrock, very hard	4	301
Sandrock	103	404
Sandrock of white quartz pebbles; resembles split peas	31	435
Sandstone	38	473
Grand Rapids Series:		
Limerock (dissolves in acid)	3	476
Blue shale	29	505
Blue shale	28	533
Brown lime-rock	3	536
Soapstone. Brine at 541 ft	20	556
Upper Marshall:		
Sandstone	45	601
Brine at 557, 572 and 601 ft.		
Coldwater and Lower Marshall:		
White shale and sand, brine at 616 and 633 ft	115	716
Blue shale	23	739
White shale (gray)	50	789
Blue shale	31	820
Brown shale and white lime-rock	9	829
Blue shale	15	844
Blue limestone	7	851
Red shale	3	854
Blue shale	32	886
Red shale	3	889
Blue shale	64	953
Red shale	10	963
Blue shale	37	1000

DURAND WELL.

Record from blue print furnished by Grand Trunk R. R.

Elevation about 790 (?) A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Surface clays	12	12
Quicksand	7	19
Gravel	4	23
Hardpan	18	41
Gravel	2	43
Hardpan	19	62
Gravel	1	63
Hardpan	15	78
Blue clay	10	88
Hardpan	10	98
Gravel	2	100
Hardpan	9	109
Saginaw Coal Measures:		
Brown shale	65	174
Parma:		
8 in. casing to 176 ft.		
Water bearing gravel	4	178
If this is really under shale it must be a conglomerate.		
Hardpan and stones	60	238
Iron casing 208 ft.		
Grand Rapids (?) or Lower Marshall:		
6 in. casing to 267 ft. 89 ft. farther.		
Black shale	103	341
Well plugged at 332 ft.		
Blue shale	2	343
Black shale	12	355
Limestone	1	356
White shale	67	423
Green shale	10	433
White shale	54	487
Blue shale	20	507
Limestone	1	508
Blue shale	92	600
Limestone	5	605
White shale	14	619
Blue shale	24	643
Salt bearing sandstone	5	648
Well yields 4 gallons of brine per minute.		

ST. JOHNS WATERWORKS WELL.

Loc.: At plant.

Elevation about 765 + ft. A. T.	Thickness, feet.	Depth, feet.
Pleistocene:		
Clay with thin layers of quicksand	40	40
(This indicates the depth of the moraine at St. Johns. There is a heavy water bed at 28 ft., but the supply is too near the surface to be considered safe.)		
Coarse gravel	112	152
Saginaw Coal Measures:		
Red sandstone, bearing some water	20	172
Blue shale	202	374
Black shale with alternating hard and soft layers	1	375
White, water bearing sand rock (Parma?)	150	525
Gray, water bearing sand rock	10	535
Michigan Series?		
Black shale	15	550
Blue shale	24	574