

University of Wisconsin-Extension

GEOLOGICAL AND NATURAL HISTORY SURVEY
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A RECONNAISSANCE SURVEY OF WELLS IN EASTERN
WISCONSIN FOR INDICATIONS OF MISSISSIPPI VALLEY
TYPE MINERALIZATION

by

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INTRODUCTION

Mineral production from the Upper Mississippi Valley Mineral District was confined to southwestern Wisconsin, northwestern Illinois, and a small part of northeastern Iowa. Heyl and West (1982) reported a significant number of outlying mineral occurrences, which suggested that the total area of mineralization was much larger than the developed district, and that mineralization might occur below and above the Galena, Decorah and Platteville Formations, which hosted most of the mineralization in the producing district.

Some occurrences reported by Heyl and West were far to the east and north of the district, on top of or to the east of the axis of the Wisconsin Arch. These reports were intriguing in that they suggested that mineralization might have extended over the arch or perhaps originated from the Michigan Basin to the east. Copper, lead, and zinc sulfides as well as fluorite had been reported in the Oshkosh area of eastern Wisconsin (Bagg, 1918). Mineral collectors reported sulfides, primarily pyrite and marcasite from Silurian rocks in Racine and Milwaukee Counties, and from Galena/Platteville quarries in the Oshkosh area. This study is a first attempt to summarize these occurrences and to compile occurrences of (Mississippi Valley type) mineralization reported in water wells and boreholes logged by the Wisconsin Geological Survey.

METHODS

WGS & WMS
Open File
Collection

For this study we examined approximately 1,900 logs of water wells for which cuttings sets exist and have been studied by WGS geologists. Published logs were examined and reports of mineralization, particularly, galena, sphalerite, copper minerals, fluorite, and exceptionally abundant pyrite or marcasite were noted.

Occurrences are tabulated by county in appendix A. Well number refers to the WGS unique county number, which is used to locate the well and to retrieve the sample set stored in the WGS repository in Milwaukee. It is important to note that these logs were made by a variety of geologists from the early 1900s through the present, and vary significantly in quality. The logs were originally prepared for stratigraphic correlation and hydrologic characteristics, and it is probable that accessory minerals were often overlooked. We have recorded only those wells that mention the presence of metallic mineralization.

OCCURENCE OF MVT MINERALS

Fluorite

Fluorite has been reported in two areas in eastern Wisconsin. Trace amounts were noted in Ozaukee, Milwaukee, Racine, and Kenosha Counties (fig. 1) in formations

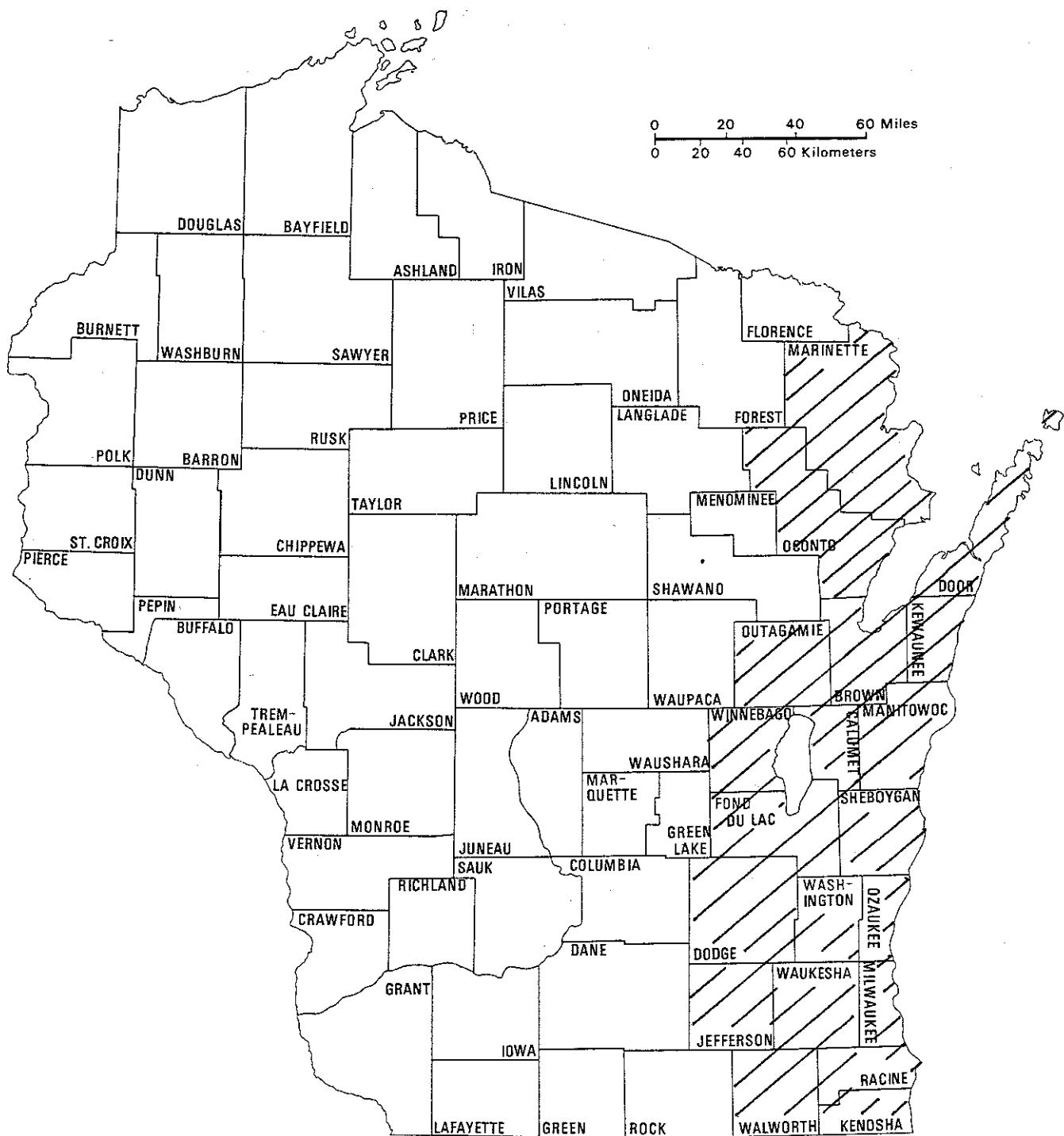


Figure 1. Counties for which WGS Geologic Logs were examined.

ranging in age from the Niagara dolomite (Silurian) down to the St. Lawrence dolomite (Cambrian). Although the occurrences are few and scattered, the report of fluorite in one exploration drillhole drilled by Mobil and logged by company exploration geologists suggests that the other reports are reliable or at least credible.

The most notable area of fluorite occurrence in Wisconsin is in Brown, Outagamie, and Winnebago Counties, between Green Bay and Oshkosh. Bagg (1918) reported fluorite as veins and surface coatings associated with galena and sphalerite in a 5-foot interval of Galena-Platteville dolomite at a quarry in Neenah. Svanoë (1937) verified this occurrence and referred to other undocumented occurrences reported nearby. The Neenah site is no longer exposed, but fluorite is reported in one recent Outagamie County well. Svanoë (1937) used optical methods to identify fluorite in two Green Bay municipal wells. His examination of mineral separates from cuttings identified intervals of fluorite concentration similar to that described by Bagg (1918) in outcrop. The fluorite occurred in the Galena/Platteville and underlying Prairie du Chien dolomites.

Sphalerite

Sphalerite in trace amounts is reported in 12 wells scattered throughout the area east of the Wisconsin Arch. Sphalerite is usually associated with pyrite/marcasite, and occasionally with galena or chalcopyrite. Occurrences are primarily in Galena/Platteville carbonates, but range from the Silurian down to the Prairie du Chien. Isolated

occurrences of sphalerite are known from quarries in the Galena/Platteville in Winnebago County and the Silurian Niagara dolomite in Manitowoc County as well as on the Wisconsin Arch in Rock County.

Galena

Galena is reported in trace quantities in 12 wells between the Green Bay area and the Illinois border. Seven reported occurrences are in Silurian rocks, four in the Galena/Platteville and one in the Prairie du Chien. The distinctive appearance and physical properties of galena suggest that reported occurrences are probably accurate and that galena is present over a wide area, but not particularly common in the region.

Copper minerals

Copper minerals, notably chalcopyrite and malachite are widely reported in the subsurface throughout the region. These widespread reports present a problem in that chalcopyrite is easily confused with tarnished pyrite, and malachite may be confused with glauconite or green shale fragments, both of which are ubiquitous in these rocks. Reported occurrences of chalcopyrite range stratigraphically from the Silurian down through the Prairie du Chien. The reports of chalcopyrite are given some credence by its identification in exploration core drilled by Mobil Corporation in Waukesha County.

Malachite identification is problematic for the reasons cited above, because much of the reported occurrences are below the water table and unexposed to oxidation, and because many reported occurrences lack significant quantities of accompanying pyrite or other forms of mineralization. However, some of the reported malachite may indeed be copper staining formed by the oxidation of chalcopyrite between the times that the cuttings were collected and studied. Resolution of this problem will require further investigation.

Pyrite and Marcasite

Pyrite and to a lesser extent marcasite are present in nearly all wells examined. Wells reported in appendix A showed particularly abundant iron sulfides, sometimes associated with sparry crystalline calcite, dolomite, or drusy quartz. Pyrite is commonly present in surface exposures, particularly quarries in the Silurian and Galena/Platteville carbonates. Pyrite occurs locally in these quarries as crystalline coatings on joint surfaces and as replacements of fossils. Several quarries, notably the Vulcan Materials Corporation quarry in Oshkosh are well known collecting sites.

Pyrite and marcasite occur locally as veins up to 30 cm wide along joints in Galena/Platteville quarries in Dodge and Rock Counties. The Dodge occurrence in Sec.8, T.10N., R.14E contains vertical veins up to 30 cm thick traceable across the quarry floor. The sulfides are weathered and only pyrite and marcasite were identified (B.A. Brown, field observation, 1991). The Rock County occurrence in Sec.25, T.1N., R.14E.

consists of veins of marcasite 10 cm wide along east-west joint planes in lower Platteville dolomite. This occurrence is on the Wisconsin Arch between the southwest Wisconsin mineral district and the areas of reported subsurface mineralization in Racine and Kenosha Counties.

The occurrence of pyrite and marcasite in veins suggests that mineralization may be locally well developed in this region.

ECONOMIC IMPORTANCE OF MINERALIZATION

No mineralization of economic significance has been found in Wisconsin east of the Wisconsin Arch. The only significant exploration activity occurred in 1983 and 1984 with the drilling of 17 cores of the Galena-Platteville interval by Mobil. This activity was restricted to the area from Waukesha County south to the Illinois border (see numbers with "x" suffix in appendix A). Traces of MVT mineralization (galena, sphalerite, chalcopyrite, and fluorite) were noted by company geologists who logged these cores, but no significant mineralization was found. The results of the present study suggest that MVT minerals are present in the Ordovician and Silurian carbonates of the region, but not in remarkable amounts in any of the wells examined. The occurrence of some mineralization as vertical veins in outcrop suggests, however, that vertical drill holes may not be the best way to sample.

At this stage, it can only be concluded that indications of mineralization are

present, and that considerably more study is needed to assess the economic potential of the region and to document the nature, extent and source of the minerals.

RECOMMENDATIONS FOR FURTHER WORK

This preliminary study has uncovered little evidence of the potential for economically significant lead-zinc mineralization. The two most interesting findings are the reported fluorite mineralization in the Green Bay-Oshkosh area and the widespread reporting of copper sulfides. As discussed earlier, the copper minerals may be the result of misidentification. This problem can easily be solved by reexamination of the original samples now stored in the WGS repository.

The fluorine anomaly in the Green Bay area is supported by the petrographic study of Svanoe (1937) and a water-chemistry study by Nichols (1944). The anomalously high fluoride content of well water in this region prompted a health concern, which resulted in the recognition of fluorite in Ordovician carbonates as a possible cause. The surface occurrence described by (Bagg, 1917) and the subsurface identification of fluorite suggests the need to reexamine existing cuttings sets and to check for additional occurrences in the numerous quarries in the Galena/Platteville and Silurian rocks of Winnebago, Outagamie, and Brown Counties.

REFERENCES

Bagg, R.M., 1918, Fluorine in the Ordovician Limestone of Wisconsin, Bulletin Geological Society of America Bulletin, vol. 29, p. 393-398.

Heyl, A.V. and West, W.S., 1982, Outlying Mineral Occurrences Related to the Upper Mississippi Valley Mineral District, Wisconsin, Iowa, Illinois, and Minnesota, Economic Geology, vol. 77, p. 1803-1817.

Nichols, M.S., 1944, Fluoride Content of Wisconsin Municipal Waters, Wisconsin State Board of Health, Quarterly Bulletin, p. 1-8.

Svanoe, L.T., 1937, Fluorine in the Ground Waters of Northeastern Wisconsin, Unpublished Bachelors Thesis, University of Wisconsin, Madison, 29 p.

APPENDIX A
REPORTS OF MINERALIZATION IN WELL LOGS

Brown Co.

	Well #	T	R.E.	Sec	Minerals	Geol.	Formation	Depth	
1	Bn - 126	22	19	35	Py / Sphal	Roshart	Galena / Prville	265-270	1
2	Bn - 130	23	20	40	Py	Steinwald	"	91-150	2
3	Bn - 131	23	20	6	Py	"	"	100-200	3
4	Bn - 132	23	20	21	Py	Ostrom	"	125-175	4
5	Bn - 138	23	21	22	Py	Roshart	"	280-465	5
6	Bn - 141	21	20	4	Py	Ostrom	Niagara / G / Prville	50-100, 320-450	6
7									7
8									8
9	Note: Pyrite in trace amounts occurs in most wells <th data-kind="ghost"></th>								
10	that penetrate Niagara (511) Galena/Platteville and Prairie du <th data-kind="ghost"></th>								
11	Cham Fluorite, reported abundant in several Green Bay								
12	area wells (Bn-1) but not noted by loggers.								
13									13
14									14
15									15
16									16
17									17
18									18
19									19
20									20
21									21
22									22
23									23
24									24
25									25
26									26
27									27
28									28
29									29
30									30
31									31

Calumet Co.

	Well#	T. R.E.	sec	Minerals	Geol	Formation	depth	
1								1
2								2
3								3
4								4
5								5
6								6
7								7
8								8
9								9
10								10
11								11
12								12
13								13
14								14
15								15
16								16
17								17
18								18
19								19
20								20
21								21
22								22
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Dodge County - Page 1 of 3

	Well # 1	Location T R 2 Sec			Minerals 3 Geologist	Formation 4	Depth 5	
1	Dg-20	10	16	?	pyritic	Thwaites	St. Peter	203-205
2	Dg-22	11	15	21	"	"	Galena / Platt	225-247
3	Dg-28	13	15	4	"	"	" "	150-155
4	Dg-29	12	14	33	"	"	" "	85-110
5	Dg-34	13	15	4	"	"	Galena / Black	27-50, 55-95, 180-185
6	same				some pyrite	"	St. Peter	225-285
7	Dg-35	12	16	23	pyritic	"	Mazomanie	590-605
8	Dg-42	13	17	15	"	"	Richmond	200-210
9	Dg-43	13	17	15	"	"	"	156-165
10	same				"	"	Galena / Platt	635-645
11	Dg-44	13	17	15	"	"	" "	660-675
12	Dg-45	12	16	23	"	"	" "	410-420
13	Dg-49	10	16	9	pyrite	"	" "	65-75
14	Dg-60	9	15	13	pyritic	Steuerwald	" "	220-235
15	Dg-61	13	17	3	little py	Roshardt	Magoketa	225-230, 255-260, 785-390
16	same				" "	"	Sinnipee	455-460, 675-680
17	"				" "	"	St. Peter	820-825
18	"				" "	"	Tunnel City	870-875
19	"				" "	"	Wonewoc	1020-1035
20	"				" "	"	Eau Claire	1070-1075, 1110-1115, 1135-
21	Dg-71	12	13	36	much py	Steuerwald	Platteville	37-43
22	same				little py	"	St. Peter	43-61
23	same same	#	#		" "	"	Prairie Du Chien	91-103, 127-139
24	Dg-72	12	14	33	" "	Ostrom	Galena / Platt	17-20, 100-110, 145-155
25	same				much py	"	" "	65-70, 110-115, 130-145
26	"				little py	"	St. Peter	260-265, 270-285
27	Dg-74	13	13	11	" "	"	Galena / Platt	60-75, 80-90
28	same				much py	"	" "	75-80, 90-95
29	"				little py	"	St. Peter	180-185
30	Dg-75	13	17	5	pyritic	Roshardt	Magoketa	100-115
31	same				little py	"	"	115-140, 240-255
	"				" "	"	Eau Claire	960-985, 1025-1045

Dodge County - Page 2 of 3

Well #	Location			Minerals 3 Geologist	Formation	Depth	
1	T	R	Sec		4	5	
1 Dg-77	13	13	11	little py Ostrom	Galena/Platteville	70-90	1
2 same				much py "	" "	90-100	2
3 Dg-78	11	16	12	little py "	" "	250 - 260 335, 340-345,	350 3 95
4 same				much py "	" "	335-340	4
5 Dg-83	13	17	26	little py "	Niagara	70-75	5
6 Dg-85	11	15	7	much py "	Galena/Platt	60-80, 115-120, 130-140	6
7 same				little py "	" "	80-115, 120-130	7
8 "				" " "	St. Peter	150-155	8
9 "				much py "	Trempealeau	305-315	9
10 Dg-92	13	17	5	little py Reshavolt	Shaw Sinnipee	670-685	10
11 Dg-94	13	17	3	" " "	Maquoketa	230-240	11
12 same				" " "	Shaw Sinnipee	455-460	12
13 "				much marcasite "	"	570-585	13
14 "				little "	"	590-595	14
15 "				much py "	"	610-620	15
16 "				little py "	St. Peter	745-760, 815-820	16
17 "				" " "	Fair Claire	1060-1065, 1110- 1120 1140	17
18 "				Much py "	" "	1155-1175	18
19 Dg-109	10	15	22	little py Ostrom	Galena/Platt	90-95	19
20 Dg-110	11	14	2	" " "	" "	80-85	20
21 Dg-113	11	14	4	much py "	" "	40-50	21
22 Dg-128	13	13	11	" " "	" "	55-60	22
23 same				" " "	St. Peter	60-75	23
24 Dg-130	12	16	14	" " "	Galena/Platt	220-225, 290-310	24
25 same				" " "	St. Peter	430-455	25
26 Dg-131	11	13	4	little py Olmstead	P. Du Chien	85-90	26
27 Dg-132	10	16	10	" " Ostrom	Galena/Platt	195-200	27
28 Dg-1008	11	15	1	" " Massie	Sinnipee	100-105	28
29 Dg-1007	13	16	26	" " "	Maquoketa	110-125	29
30 same				" " "	Fair Claire	950 950-970	30
31 "				" " "	Mt. Simon	1045-1065	31

Dodge County - Page 3 of 3

	Well #	Location T R Sec	Minerals 3 Geologist	Formation 4	Depth 5	
1	Dg-1117	12 14 22	little py Messic	Glenwood	180-185	1
2	same		" " "	Roadstown	315-330	2
3						3
4						4
5						5
6						6
7						7
8						8
9						9
10						10
11						11
12						12
13						13
14						14
15						15
16						16
17						17
18						18
19						19
20						20
21						21
22						22
23						23
24						24
25						25
26						26
27						27
28						28
29						29
30						30
31						31

Door County - Page 1 of 2

	Well #	Location			Minerals	Geologist	Formation	Depth	
		T	R	Sec					
1	Dr-18	31	27	16	pyritic	Thwaites	Richmond	255-265	1
2	Dr-20	28	26	20	"	"	"	505-550	2
3	Dr-23	27	26	8	"	"	"	390-406	3
4	Dr-31	31	27	16	"	Steuerwald	Niagara	100-125	4
5	Dr-36	31	27	33	little py	Ostrom	"	65-75	5
6	Dr-39	27	26	8	" "	"	"	390-400	6
7	Dr-40	31	27	16	" "	"	"	180-200	7
8	Dr-42	27	24	36	5% py	"	"	265-295	8
9	Dr-44	31	27	16	little py	Massie	Sinnipee	725-735	9
10	Dr-47	31	27	23	much py	Ostrom	Niagara	190-205	10
11	Dr-59	27	26	18	pyritic	Ver Hoew	Maquoketa	490-495, 520-525	11
12	Dr-262	27	26	5	little py	Peters	Silurian	40-45	12
13	Dr-265	27	26	5	pyritic	Ver Hoew	Maquoketa	415-420	13
14	Dr-266	31	27	28	little py	Peters	Silurian	40-65	14
15	Dr-268	31	27	28	" "	"	"	45-65, 80-95, 180-190	15
16	same				" "	"	Maquoketa	250-285, 280-322	16
17	Dr-289	29	27	32	fr cpy	Massie	"	580-585, 620-635	17
18	same				" "	"	Tunnel City	1750-1755	18
19	"				malachite?	"	Coon Valley	1670-1695	19
20	Dr-290	32	29	20	little py	Ver Hoew	Silurian	15-30, 50-55, part of 210-255	20
21	same				much py	" "	"	90-105	21
22	Dr-291	30	27	30	pyritic	" "	"	55-65, 100-125, 160-165	22
23	Dr-292	27	26	18	" "	" "	"	245-250	23
24	same				little py	" "	Maquoketa	490-505	24
25	Dr-293	30	24	26	" "	Massie	Silurian	55-60, 185-190	25
26	same				" "	"	Maquoketa	260-265	26
27	Dr-294	30	26	26	pyritic	Ver Hoew	"	210-220	27
28	Dr-297	30	27	13	little py	" "	Silurian	215-220	28
29	same				" "	" "	Maquoketa	425-530, 465-480, 475-485	29
30	"				" "	Hartman	"	715-730	30
31	Dr-390	27	25	12	" "	Massie	Silurian	230-240	31

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of 2

Hans Lohman - Geologist

Identifications suspect

A 7

Well #	1	Location			3 Geologist	Formation	Depth	5
		T	R	Scc				
1	Dr-301	32	29	20	little py Roshardt	Silurian	175-180	1
2	Dr-305	28	26	24	malachite Hartman	"	scattered 15-100	2
3	Dr-306 same	20	27	26	tr py	"	" 15-290	3
4	Dr-308	30	27	18	" "	Schwendt	"	290-295, 315-320, 330-340
5	same				" "	"	360-365, 380-385, 390-395,	400-405
6	Dr-310	31	27	27	little py	Massie	"	165-180
7	Dr-314	30	26	24	pyritic	Schwendt	Maguoketa	230-257.
8	Dr-320	27	26	8	tr py	"	Silurian	165-170
9	Dr-321	26	25	5	little py	"	"	175-185
10	same				" "	"	Maguoketa	400-425
11	"				tr py	"	"	405-420
12	Dr-322	26	25	8	" Cu sulfide	"	Silurian	160-165
13	same				much py	"	Maguoketa	410-415
14	Dr-324	31	27	28	little py	"	Silurian	55-75
15	Dr-325	31	27	15	tr py Cu sulfide	"	Maguoketa	190-195
16	Dr-326	27	26	21	little py	"	Silurian	120-145
17	same				tr Cu sulfide	"	"	85-70, 120-145, 490-495
18	same				little py	"	Maguoketa	520-525
19	Dr-329	28	27	2	" "	"	Silurian	65-70
20	Dr-330	30	26	24	" "	"	"	90-95
21	same				Cu sulfides	"	"	90-95
22	Dr-331	29	27	1	tr Cu sulfide	"	"	130-135
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Fond du Lac Co.

	Well#	T	R.E.	Sec	Minerals	Geologist	Formation	depth	
1	FL-15	15	14	21	Py	Thwaites	PdC	110-170	1
2	FL-37	15	17	9	Py	"	Galena/Pvile	200-220	2
3	FL-41	15	17	15	Py	"	"	190-250	3
4	FL-56	15	14	36	"	"	"	185-190	4
5	FL-275	16	18	17	"	"	"	25-320-325	5
6	FL-311	15	17	17	"	Steinwald	"	25-45 & 130-145	6
7	FL-332	15	16	19	"	"	"	100-110	7
8	FL-334	14	15	3	"	"	"	70-80, 195-205	8
9	FL-342	16	14	R10n	"	Ostrom	"	50-60	9
10	FL-343	15	17	22	"	"	"	235-280	10
11	FL-347	15	17	16	"	"	"	60-105	11
12	FL-351	16	14	21	"	"	Gal/Pvile & PdC	5-60 & 130-155	12
13	FL-352	14	15	31	"	"	Galena/Pvile	55-80	13
14	FL-355	16	18	32	"	"	Little from Silurian thru PdC.	"	14
15	FL-373	14	16	14	"	Warren	Galena/Pvile	125-200	15
16	FL-369	14	15	36	"	"	"	40-50	16
17									17
18									18
19	Note most wells penetrating Niagara, Magnesite, Galena/Pvile Streeter and Prairie du Chien report trace to minor fayalite no other sulfides noted								
20									19
21									20
22									21
23									22
24									23
25									24
26									25
27									26
28									27
29									28
30									29
31									30
									31

Jefferson County

	Well #	T	Location R 2 Sec	Minerals	Formation	Depth	
				3	4	5	
1	Je - 98	6	14 11	little py Ostrom	Mt Simon	865-885	1
2	Je - 104	8	16 22	" " "	Galena / Plattville	175-215, 275-285,	315-325
3	Je - 105	8	15 4	" " "	" "	60-65, 70-100	3
4	same			" " "	St. Peter	100-110, 130-135	4
5	Je - 106	6	16 3	" " "	Galena / Platt	150-155	5
6	same			much py "	" "	155-158	6
7	Je - 110	8	15 4	little? py Roshardt	Wonewoc	485-520	7
8	Je - 117	5	16 35	little py Ostrom	Galena / Platt	370-395, 465-475	8
9	Je - 118	8	16 22	little? py "	" "	110-120, 130-150, 175-190, 240	-285
10	Je - 139	5	16 35	little py "	" "	490-495	10
11	Je - 145	7	14 8	much? py "	Franconia (Wonewoc?)	285-290	11
12	same			" ? " "	Oreibach	325-330	12
13	Je - 65	8	15 4	much? py Ostrom	Galena / Platt	60-65	13
14	same			" " "	St Peter	130-145	14
15	Je - 142	6	15 20	much py Ostrom	Galesville	425-435	15
16	Je - 856 same	8	16 21	" " "	Eau Claire / Mt Simon	545-610, 625-695	16
17	Je - 856-X	8	16 21	tr py, marc Mobil Oil	Sinnipee	scattered 62-310	17
18	same			" " " "	St. Peter	" 313-317	18
19	"			tr sphalerite "	Sinnipee	69, 128, 214, 215	19
20							20
21							21
22							22
23							23
24							24
25							25
26							26
27							27
28							28
29							29
30							30
31							31

Kenosha County

Location

	Well #	T. (north)	R. (east)	Sec.	Minerals 3 Geologist	Formation 4	Depth interval 5	
1	Ke - 10	1	22	13	pyrite	Niagara	# 140-144'	1
2	Ke - 24	2	20	15	"some" pyrite	Galena - Platteville	parts of 465-550	2
3	Ke - 26	2	20	15	little py	" "	parts of 410-730	3
4	Ke - 27	2	22	8	tr. py	" "	645-700	4
5	Ke - 56	1	22	30	little pyrite	Niagara	200-250	5
6	Ke - 291	1	21	7	" "	Maquoketa	294-310	6
7	Ke - 294	2	20	10	much magnetic sulfides	Silurian undiff.	240-250	7
8	same	-	-	-	" "	Maquoketa	280-290	8
9	"	-	-	-	" "	Galena - Platteville	460-475	9
10	Ke - 295	1	21	2	trace fluorite	Sinnippee	720-725	10
11	Ke - 297	1	22	30	little pyrite	Silurian undiff.	230-240	11
12	Ke - 352	1	22	6	" "	" "	160-165	12
13	Ke - 358	2	22	32	Cu sulfides trace to much	" "	180-195	13
14	Ke - 413	2	20	14	Chalcopyrite, tr.	Maquoketa	340-350	14
15	same	-	-	-	" "	Sinnippee	390-400	15
16	Ke - 212-X	1	22	6	tr. py, marcasite Mobil Oil	Maquoketa, Sinnippee	scattered 644-922	16
17	same	-	-	-	tr. Cu?	" "	888	17
18	Ke - 211-X	1	21	2	tr. py, marcasite	" "	scattered 600-800	18
19	same	-	-	-	tr. sphalerite	" "	686, 726	19
20	Ke - 213-X	2	20	14	tr. galena	" "	726	20
21	Ke - 213-X	2	20	14	tr. py, marcasite	" "	scattered 399-674	21
22	same	-	-	-	tr. sphalerite	" "	481, 551, 756, 759, 600	22
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Kewaunee County

Hartman et al.

Identification suspect

A II

Well #	Location T R 2 Sec	Minerals 3 Geologist	Formation	Depth 5	
1	KW - 2	25 25 26	Pyritic Thwaites	Galena/ Platte	1140-1150
2	KW - 8	24 23 21	" Stegwald	Niagara	265-330
3	KW - 9	25 25 27	little py Ostrom	"	220-245
4	KW - 29	25 25 34	" " Roshardt	Silurian	585-590
5	same		" "	St. Peter	1305-1710
6	KW - 131	24 23 24	" " Massie	Tonti	1030-1035
7	KW - 132	25 25 27	Pyritic Ver Hoeve	Silurian	200-215
8	KW - 134	24 24 11	tr copy Hartman	"	parts of 410-540
9	same		" "	Maguoketa	" " 545-885
10	"		little py "	"	765-770
11	KW - 135	24 23 21	tr copy Schwandt	Silurian	50-55, 70-75
12	same		Cu sulfides "	"	140-145
13	"	" "	"	Maguoketa	370-375, 445-450, 480-485, 495-505
14	"		little py "	"	445-490, 500-590
15	"		tr Cu Sulfides "	Sinnipee Sinnipee	820-825, 870-880
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

545-
550
665-
670
710-
715

Manitowoc County

	Well #	Location			Minerals 3 Geologist	Formation	Depth 5	
		T	R	Sec				
1	Mn - 395	19	23	5	pyritic malachite	Ver Hoew Hartman	Silurian	340-350
2	Mn - 411	18	22	5		"		parts of 205-250
3	Mn - 471	19	21	2	little py	Schwandt		360-370, 415-420
4	same				" "	"		425-430
5	"				tr copy	"	Silurian	320-325
6	Mn - 497	21	24	24	" "	"	"	225-230
7								7
8								8
9								9
10								10
11								11
12								12
13								13
14								14
15								15
16								16
17								17
18								18
19								19
20								20
21								21
22								22
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Marinette Co

	Well #	T R sec	Minerals	Geol Examining	Formation	Depth	
1	Mt-16	30N 24E 6	Pyrite	Ftthwaite	Trempealeau	500-522	1
2	Mt-22	30N 24E 8	Pyrite	"	Platt/Galena	290	2
3	"				P. du Chien	530	3
4	Mt-24	30N 23E 19	Py	?	Galena/Psville	60-65, 120-125	4
5	-	-	Py	-	Prairie du Chien	130-135, 325-30, 395-400	
6	Mt-25	30N 20E 11	Py scattered	90'-310'	Cambrian		6
7	Mt-32	30N 20E 14	Trace Py	90-310'	Cambrian		7
8	Mt-33	30N 23E 32	Py (much)	Roughat	Galena/Psville	60-65	8
9	-	-		Trace reported	All Galena/Psville, Pdvc		9
10	Mt 187	30N 20E 19	Py Trace	Galena to Mt Simon	Seams 55-60		10
11	Mt 190	30N 23E 32	Py/Marc	K Massif	Trace thru Galena/Psville & Pdvc		11
12	Mt-192	30N 23E 32	Py	M. Roseholst	" " "	"	12
13							13
14							14
15							15
16							16
17							17
18							18
19							19
20							20
21							21
22							22
23							23
24							24
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26							26
27							27
28							28
29							29
30							30
31							31

Milwaukee County - Page 1 of 4

A 14

	Well #	Location T R 2 Sec.			Minerals 3 Geologist	Formation 4	Depth. 5	
1	M1-14	7	21	27	pyrite Thwaites	Galena-Platteville	788-805	1
2	M1-15	7	21	15	very pyritic "	Niagara	435-450	2
3	M1-24	7	21	29	much pyrite "	Richmond	372-375	3
4	same				pyrite "	Galena-Black R.(Platteville)	785-793	4
5	M1-36	7	21	12	pyritic "	Richmond	430-435	5
6	same				very pyritic "	Galena-Platteville	772-774	6
7	same				pyritic "	" "	835-850	7
8	M1-45	7	22	29	some py	Niagara	440-495	8
9	M1-59	7	22	29	pyritic "	Richmond	520-525	9
10	M1-80	6	22	7	pyritic "	"	470-490	10
11	M1-85	6	22	20	" "	Galena-Platteville	940-960	11
12	M1-87	6	22	14	pyrite "	Niagara	325-350	12
13	M1-91	6	21	34	pyritic "	Galena-Platteville	710-715	13
14	M1-93	5	21	5	" "	" "	720-730	14
15	M1-94	6	21	32	" "	Richmond	283-290	15
16	M1-104	6	21	1	pyrite "	"	433-455, 550-560	16
17	M1-107	6	21	1	pyritic "	"	435-440	17
18	same	7 21 1			" "	Galena-Platteville	840-865	18
19	M1-128	6	21	6	" "	Richmond	311- 345 345, 360-372	19
20	M1-133	6	21	1	" "	"	*part of 460-490	20
21	M1-160	7	21	8	" "	Richmond	300-308	21
22	M1-286	7	21	15	" "	"	475-520	22
23	M1-287	6	21	14	" "	Galena-Platteville	800-810	23
24	M1-294	7	21	25	" "	Niagara	315-365	24
25	same				very pyritic "	"	435-455	25
26	M1-297	6	21	4	pyrite "	Richmond?	260-280	26
27	M1-298	7	22	3	pyritic "	Milwaukee	220-230	27
28	M1-299	7	22	33	" "	Niagara	440-460	28
29	same				" "	Richmond	460-480	29
30	M1-309	7	22	5	" "	Niagara	210-230	30
31	M1-311	7	22	5	" "	Thiensville?	105-120	31

Milwaukee County - Page 2 of 4

	Well #	Location			Minerals	Geologist	Formation	Depth	
		T	R	Sec					
1	M1-332	5	22	24	pyritic	Thwaites	Galena-Platteville	935-950	1
2	M1-352	5	21	5	much pyrite	RMP	Magnoketa	250-265	2
3	M1-391	6	21	22	pyritic	Thwaites	Niagara	165-195	3
4	M1-404	8	21	14	"	Steuerwald	"	80-85	4
5	M1-406	5	21	22	little py	"	"	270-280	5
6	same				pyritic	"	Galena-Platteville	920-935	6
7	M1-417	8	22	30	"	Thwaites	Niagara	510-550	7
8	same				"	"	Galena-Platteville	945-965	8
9	M1-424	6	21	22	"	"	Niagara	220-250	9
10	M1-431	8	21	11	"	Steuerwald	"	365-400	10
11	same				pyrite	"	Galena-Platteville	885-900	11
12	same				pyritic	"	" "	910-940	12
13	M1-432	7	21	30	"	"	Niagara	280-285	13
14	M1- 445 445	6	21	32	"	"	"	105-110	14
15	M1-446	5	22	25	"	?	Galena-Platteville?	890-900	15
16	M1-448	6	21	30	"	Steuerwald	Richardson	310- 335 335	16
17	M1-453	5	21	12	"	"	Niagara	235-240, 320-325	17
18	M1-455	7	21	17	"	"	"	170-215	18
19	same				"	"	Galena-Platteville	625-645	19
20	M1-457	8	21	2	"	"	Niagara	515-520	20
21	M1-458	8	22	19	"	"	Devonian	85-100, 130-145	21
22	M1-464	7	21	7	little py	Ostrom	Niagara	140-150, 215-230, 255- 2622	22
23	same				"	"	"	270-295, 335-340, 345- 350 23	23
24	"				much py	"	"	350-365	24
25	"				little & py	"	Galena-Platteville	520-685, 695-730, 745-785	25
26	M1- 465 465	7	21	5	"	"	Niagara	365-370	26
27	M1-466	7	22	21	much py	"	"	170-180	27
28	same				little py	"	"	180-200	28
29	M1-467	7	21	18	little-much py	"	Richardson	350-375	29
30	M1-468	8	22	29	little py	"	Niagara	140-150, 570-585	30
31	same				very pyritic	"	"	545-560	31
	same				pyritic	"	Galena-Platteville	870-870	

Milwaukee County - Page 3 of 4

A 16

	Well #	Location			Minerals	Formation	Depth	
	1	T	R	Sec.	3 Geologist	4	5	
1	MI- 469	8	22	32	little py Ostrom	Niagara	265-290	1
2	MI- 472	5	21	21	much py " "	Maguoketa	410-425, 455-480	2
3	same				little py " "	Galena-Platteville	655-675, 725-750, 780-830	
4	"				much py " "	" "	750-760	4
5	MI- 474	8	21	2	little py " "	Devonian	60-65	5
6	MI- 478	5	21	5	" "	Maguoketa	345-360, 380-385, 435-445	
7	MI- 482	7	21	5	much py little py " "	Niagara	255-270, 400-430, 510-517	
8	same				" "	Galena-Platteville	710-730, 765-790	8
9	"				little py " "	" "	655-685, 730-765	9
10	MI- 485	8	22	20	" "	Niagara	127-210	10
11	MI- 486	8	22	4	" "	"	155-160	11
12	MI- 488	8	22	2	" "	"	105-120	12
13	MI- 489	8	21	24	" "	Silurian	110-120, 195-200	13
14	MI- 491	5	21	15	" " Ver Hoeve	"	165-175, 255-275	14
15	same				" "	Maguoketa	320-330	15
16	MI- 492	7	22	32	much py Ostrom	Niagara	440-450	16
17	same				" "	Maguoketa	450-470, 560-565, 570-575	
18	same				little py " "	Galena-Platteville	625-635, 690-735	18
19	"				much py " "	" "	760-775	19
20	MI- 497	5	21	5	pyritic Ver Hoeve	Silurian	185-195	20
21	MI- 498	6	21	25	little py Ostrom	Niagara	160-190, 470-475	21
22	same				much py " "	"	460-470, 475-480	22
23	MI- 500	5	22	6	little py Ver Hoeve	Silurian	135-140, 185-190, 320-335	
24	MI- 502	8	22	19	" " Ostrom	Niagara	130-140	24
25	MI- 512	6	21	31	" " "	Galena-Platteville	640-655	25
26	MI- 513	5	21	13	" " Hassie	Galena	740-750	26
27	same				rusty limonite much py " "	Platteville	800-805	27
28	MI- 514	5	21	5	little py " "	Maguoketa	285-290	28
29	MI- 539	7	22	29	" " Warren	"	475-480, 485-495	29
30	MI- 542	6	21	31	" " "	Silurian	365-375	30
31	MI- 543	6	21	29	little? py " "	Galena-Puille	560-565, 680-685, 715-720	31

Milwaukee County - Page 4 of 4

	Well #	Location			Minerals 3 Geologist	Formation	Depth	
	1	T	R	Sec.		4	5	
1	M1-546	5	21	15	little py Roshardt	Silurian	270-275	1
2	M1-547	6	21	32	" " "	Maquoketa	300-305, 310- 320 335	2
3	M1-548	5	21	17	" " "	"	275-285	3
4	same				little? py "	Tunnel City	930-940, 940-955, 950-	4
5	M1-550	5	21	15	little py "	Maquoketa	360-365, 430-440, 445-	450
6	M1-569	5	21	25	" " "	Silurian	310-315	6
7	same				much py "	Maquoketa Nada	270-380	7
8	same				little py "	Maquoketa	445-450, 515-525	8
9	M1-570	6	21	29	" " "	"	280-305	9
10	M1-571	6	21	30	tr fluorite	Silurian	325-330	10
11	same				little py "	Maquoketa	335-365	11
12	M1-591	6	21	31	" " "	"	290-310	12
13	M1-595	5	21	16	" " Hartman	Silurian	230-235	13
14	same				" " "	Maquoketa	435-440	14
15	M1-608	8	22	9	" " Schwandt	Devonian	135-150, 205-210	15
16	M1-659-R	7	22	16	pyrite nodules ?	Milwaukee (Dev.)	89-141	16
17	M1-713	8	22	5	trace eopy Schwandt	Silurian	275-280, 315-320, 370- 375	415- 420 460- 465
18	M1-716	8	22	9	" " "	Devonian	60-65	515-520
19	M1-728	8	21	13	" " "	"	130-135	19
20	M1-729	8	21	13	" " "	"	95-105, 115-120	20
21								21
22								22
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Oconto Co.

A 18

	#	T RE.	sec	Minerals	Geologist	Formation		
1	OC-170	18	21	13	Py	M. Hartman	PdC. & Cambrian	105-180 Scattered
2							Thru entire section	
3	OC-194	27	20	23	Py, Sphal. KM-F		PdC	25-85'
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
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Otagamie Co

Well #	T	R.E.	Sec	Minerals	Geol / Examiner	Formation	Depth	
1	2	3	4	5	6	7	8	9
1 Oa-34	21	18	21	Py	Fayalite	Galena/Pv/ile	149-154	1
2	"	"	"	"	"	Pdu Chalc	184-200	2
3 Oa-44	21	17	33	Py	K-Magrite	St Peter	Scattered 30-200	3
4 Ou 46	21	18	23	Py	Thwaites	Galena/Pv/ile	235-245	4
5 Ou 99	21	19	6	"	"	PdC	215-230	5
6 Ou 101	22	17	31	Py	"	"	14-19	6
7 Ou 293	22	18	lot 29	Py	"	Galena/Pv/ile	45-55	7
8 Ou 299	21	18	73	Py	J.G.S.	PdC	275-285	8
9 Ou 318	—	—	—	—	—	? Chalc w Sulfides	318-320	9
10 Ou 315	LITTLE Chote	Sphal.	—	—	—	—	321	10
11 Ou 317	21	18	lot 27	Py	MFO	Galena/Pv. & PdC	65-390	11
12 Ou 321	21	17	28	Py	Northeast	PdC	55-220	12
13 Ou 393	21	17	13	Fluorite	KMF	Galena Pv/ile	120-125	13
14 Ou 334	21	18	23	Py	K-M-F	Gal/Pv/SteP/PdC	25-350	14
15 "	"	"	23	Malachite/Cpy	"	PdC	240-275	15
16 Ou 336	21	17	36	Py	KMF	Galena/Pv/ile	85-150	16
17 "	"	"	"	Malachite/Py/Chalc	PdC	PdC	180-250	17
18 "	"	"	"	galena	PdC	PdC	295-300	18
19 Ou 348	24	18	11	Py	KMF	Galena/PV	50-55	19
20 " "	"	"	"	Chalc/Pyrolusite/Marc	PdC	PdC	180-250	20
21 Ou 392	21	18	33	Chalc/Py/Cu Stalts	Galena/PV	Galena/PV	105-120	21
22								22
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Ozaukee County - Page 1 of 3

	Well #	Location T R Sec.			Minerals 3 Geologist	Formation 4	Depth 5	
1	OZ-27	10	21	34	pyritic Thwaites	Niagara	140-145, 180-200	1
2	same				" "	Galena-Platteville	910-935	2
3	OZ-34	9	21	27	much py Steuerwald	Niagara	135-140	3
4	OZ-39	10	21	24?	little py "	"	370-410	4
5	same				pyritic "	"	590-620	5
6	same				" "	Richmond	630-640	6
7	same				" "	Galena-Platteville	880-910 955-995	7
8	OZ-40	9	21	24	very pyritic	"	Richmond	600-606
9	OZ-41	9	21	23	pyritic	"	Niagara	360-370
10	OZ-43	9	21	26	little py Ostrom	"	170-175	10
11	OZ-44	9	21	14	" "	"	115-150	11
12	OZ-48	9	22	29	" "	Magneoketa	650-655, 685-690	12
13	OZ-50	9	22	30	" " Schwandt	Devonian	185-190	13
14	same				" "	Silurian	240-245, 300-315	14
15	"				much py "	"	355-360	15
16	"				" "	Magneoketa	600-610	16
17	"				little py "	"	610-630	17
18	OZ-69	12	21	26	" " Ostrom	Niagara	80-85	18
19	OZ-71	12	21	26	much py "	"	135-145	19
20	OZ-72	9	21	34	" " "	"	130-135	20
21	OZ-73	9	21	36	" " "	Galena-Platteville	785-795, 830- 855 860	21
22	same				" " "	St Peter/Prestbach	1030-1045	22
23	OZ-78	10	21	27	little py Warren	Magneoketa	750-755	23
24	OZ-79	10	21	17	" " Olmstead	Silurian	245-275, 290-310	24
25	same				" " "	Magneoketa	580-600, 710-725	25
26	"				" " "	Galena-Platteville	905-930	26
27	OZ-88	11	22	28	much py Rosenthal	Magneoketa	735-750	27
28	same				gr sp sphalerite "	"	720-725	28
29	OZ-89	10	21	34	little py "	"	555-565, 580-585, 665-670	29
30	same				" " "	Galena-Platteville	705-710	30
31	"				" " "	Platteville	875-900	31

Marinette Minerals A'21

Ozaukee County - Page 2 of 3 identification suspect

Well #	Location T R Sec	Minerals	Geologist	Formation	Depth	
						6
1	OZ-285	9 21 26	trace fluorite Rosenthal	Silurian	250-255, 260-265, 270-	275, 310-395
2	OZ-350	9 22 30	little py	"	150-160	2
3	OZ-353	9 21 25	" "	Devonian	145-150	3
4	OZ-354	9 21 29	" "	Silurian	250-255	4
5	same		" "	Magnokata	537-557	5
6	OZ-356	9 21 23	" " ?	Devonian	75-180	6
7	same		" "	Silurian	175-180	7
8	OZ-357	9 22 29	" "	Devonian / Silurian	310-325, 370-375	8
9	same		much py	"	375-340	9
10	"		little py	Magnokata	615-630, 635-650, 675-	685 ¹⁰
11	"		much py	"	630-635, 650-660	11
12	"		little py	St. Peter	1080-1090	12
13	OZ-362	9 21 36	pyritic	Ver Hoeve	160-165, 175-185, 190-195,	24 ¹³ -250
14	OZ-363	9 22 32	tr cpy	Schwandt	195-200, 235-240	14
15	OZ-366	9 21 36	pyritic	Ver Hoeve	210-225, 385-390, 430-450	15
16	same		little py	" "	300-335, 525-545	16
17	OZ-414	9 21 36	" "	Schwandt	4120-425, 430-435, 440-445	44 ¹²
18	same		" "	Silurian	455-460, 550-560	18
19	"		" "	Neda	560-565	19
20	OZ-431	9 22 30	much py	"	162-175	20
21	same		little py	Silurian	305-320, 340-355	21
22	OZ-436	9 22 32	" "	Ver Hoeve	355-360	22
23	OZ-451	10 22 4	" "	"	210-220	23
24	OZ-453	12 22 15	" "	"	95-100	24
25	OZ-454	9 21 26	" "	"	175-185	25
26	OZ-455	9 21 27	" "	"	78-90	26
27	OZ-456	9 22 18	tr malachite	Hartman	355-365, 375-380, 405-410	27
28	same		" "	"	430-435, 440-445	28
29	"		tr cpy	"	400-405, 410-415	29
30	OZ-458	9 22 30	tr cpy	"	315-335 ² , 360-365, 370-375	30 ²
31	same		" "	"	385-400, 405-410, 430-435	480 ³
	"		tr malachite	"	440-445, 455-465	485
	"		tr galena	"	425-535-540	530

tr cpy and malachite " Magnokata 605-622
 veins of cpy " Devonian / Silurian 375-380
 veins of py " " " 320-325

Ozaukee County - Page 3 of 3

	Well #	Location			Minerals	Formation	Depth	
		T	R	Sec	3 Geologist	4	5	
1	OZ-460	9	22	32	much py little py	Schwendt " " "	Devonian " "	82-85, 90-93
2	same				tr cpy	"	"	85-90, 93-120
3	"				" "	"	"	180-185
4	"				little-much hematite	"	"	185-190
5	"				little py	"	"	335-390
6	OZ-460	9	22		tr cpy	"	"	395-400
7	OZ-464	9	22	30	much py	"	Maguoketa	620-625
8	same				tr cpy	"	"	620-625
9	"				much? arsenopy	"	"	635-640
10	OZ-471	9	22	20	little py	"	Silurian	625-627
11	OZ-472	9	22	30	much py	"	Devonian	140-145
12	same				much? py	"	Silurian	295-300
13	OZ-474	9	22	30	little py	"	"	180-185, 605-610
14	same				tr Cu sulfide	"	Maguoketa	620-624
15	OZ-475	9	21	13	little py	"	Silurian	405-410, 560-565
16	same				tr cpy	"	"	450-455
17	OZ-476	9	22	30	much py	"	"	325-330
18	same				little py	"	"	600-605
19	OZ-476 same				much py, tr Cu sulfide	"	Maguoketa	605-610
20	OZ-483	10	21	27	little py	Hassie	Silurian	375-385
21	OZ-491	9	21	36	trace cpy	Schwendt	Dev/Sil	100-105
22	OZ-492	9	21	27	" "	"	Silurian	165-170
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30
31								31

Racine County - Page 1 of 2

A 23

Location

	Well #	T (north)	R (east)	Sec.	Minerals 3 Geologist	Formation 4	Depth 5	
1	Ra - 23	3	23	9	" pyritic ", Thwaites	Trempealeau	985-987	1
2	Ra - 28	3	20	34	" "	Richmond	250-305, 705-716	2
3	Ra - 40	3	23	5	" pyrite " "	Trenton	n 900'	3
4	Ra - 49	4	23	27	little pyrite "	Platteville - Galena	635-645, 785-800, 815	- 840
5	same				trace "	" "	parts of 570-840	5
6	Ra - 55	4	20	14	pyritic, Stearns	Niagara	145-150	6
7	Ra - 56	4	23	27	" "	"	365-370	7
8	Ra - 57	3	21	30	pyritic Ostrom very pyritic "	Galena - Platteville	458-460, 545-575	8
9	same				" "	"	620-635, 685-730	9
10	Ra - 59	4	20	23	little pyrite "	Silurian	185-195, 280-220	10
11	Ra - 60	4	23	21	" "	Niagara	135-145	11
12	Ra - 340 ^{same}	4	23	28	" "	Platteville - Galena	650-780, 800-880	12
13	Ra - 340	4	19	36	trace ccopy	Silurian	95-100	13
14	Ra - 344	4	20	28	much pyrite	Niagara	190-195	14
15	Ra - 352	3	20	8	little sulfides	Maquoketa	275-285, 395-400, 430-475	
16	Ra - 353	4	22	35	little pyrite	Platteville - Galena	720-735	16
17	Ra - 357	4	20	24	tr ccopy	Silurian	280-285	17
18	Ra - 371	3	21	13	little pyrite	Galena	635-640	18
19	Ra - 372	2	19	9	" "	Silurian	110-114	19
20	same				" "	Maquoketa	150-160	20
21	Ra - 373	4	23	17	" "	Sinnipee	550-555	21
22	same				trace fluorite ?	St. Lawrence	960-970	22
23	Ra - 375	3	19	10	pyritic	Silurian	75-100, 115-120, 200-	205
24	same				" "	Maquoketa	235-265	24
25	Ra - 418	3	22	4	tr Cu sulfides	Silurian	117-125, 145-150, 160-165	25
26	same				" " "	"	190-195	26
27	same				tr ccopy	Maquoketa	350-355, 370-375, 395-400	27
28	same				" "	Decorah	665-670	28
29	same				very good Cu sulfide (cement?)	Glenwood	750-795	29
30	Ra - 416-X	3	21	30	tr py, merc Mobil Oil	Maquoketa, Sinnipee	scattered 410-668	30
31					tr sphalerite "	Sinnipee	667, 672	31

Racine County - Page 2 of 2

	Well #	Location			Minerals	Geologist	Formation	Depth	
		T	R	Sec	3	4	5	6	
1	Ra-415-x	3	21	13	tr py, marc	Mul:1 Oil	Sinnipee	scattered 613-856	1
2	same				tr galena	" "	"	660, 661, 689, 755	2
3	"				tr Fluorite	" "	"	659	3
4	"				tr sphalerite	" "	"	699, 789	4
5	Ra-417-x	3	20	35	tr py, marc	" "	"	scattered 348-627	5
6	same				tr sphalerite	" "	"	417, 419, 422	6
7									7
8									8
9									9
10									10
11									11
12									12
13									13
14									14
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30									30
31									31

Sheboygan County Page 1 of 3

	Well #	Location			Minerals	Formation	Depth	
	i	T	R	Sec	3 Geologist	4	5	
1	SB - 7	13	23	6	much py Thwaites	Niagara	250, 475-520, 555-	695, 715-730
2	SB - 8	16	21	20	pyritic	"	500-510	2
3	SB - 11	15	23	30	" "	"	288-293	3
4	SB - 18	15	21	28	" "	Richmond	465-475	4
5	SB - 54	13	22	24	little py Ostrom	Niagara	590-595, 610-620, 670-	675
6	same				much py	"	660-670, 675-680	6
7	"				" "	"	680-687	7
8	SB - 61	15	23	20	little py	"	100-110	8
9	SB - 62	16	23	4	" "	"	295-300	9
10	SB - 64	16	23	33	" "	"	265-270	10
11	SB - 66	13	20	17	pyritic	"	360-365	11
12	SB - 75	15	21	16	much py	Silurian	215-220	12
13	SB - 81	15	23	23	little py Roshardt	"	105-110	13
14	same				few py seams	"	580-585	14
15	SB - 83	15	21	26	much py and marcasite	→ Neda	478-483	15
16	SB - 86	13	22	12	tr py	Silurian	580, 742, 780, 1100	16
17	same				" "	Platteville	1170, 1179, 1181	17
18	SB - 88	13	23	19	tr cpy Hartman	Silurian	360-370, 430-440	18
19	same				malachite	"	430-460	19
20	SB - 89	13	23	18	tr cpy	"	220-235, 700-305, 360-365,	385-2035, 400-405
21	same				malachite	"	305-310, 360-365, 385-390, 395-	405-410
22	SB - 91	13	22	29	" "	"	700-310, 630-640	450-460
23	same				little py	"	410-450, 470-480, 510-520	23
24	"				" "	"	560-590, 600-610, 630-650	24
25	"				tr cpy	"	760-370, 530-550, 620-640	25
26	"				much py	"	650-659	26
27	SB - 92	13	22	13	tr galena	Silurian	490-495	27
28	same				tr cpy	"	615-620, 670-675, 700-705	28
29	"				tr malachite	"	700-705	29
30	SB - 93	13	22	20	tr galena	"	280-290, 310-340, 410-420,	30640
31	same				tr cpy	"	630-660	31
	"				" "	"	660-670	

Marathon mine
suspect - especially malachite A 26

Sheboygan County - Page 2 of 3

	Well #	Location			Minerals	Formation	Depth	
	1	T	R	Sec	3 Geologist	4	5	
1	SB-105	13	22	33	tr cepy Hartman	Silurian	230-240, 250-260, 300-	330 ¹
2	same		"	"	" "	"	340-360, 370-410, 420-460	2
3	"		"	"	" "	"	480-490, 580-650, 670-690	3
4	"				tr galena	"	680-740-760, 380-400	4
5	"				malachite	"	310-720, 360-380, 390-400	5
6	"	*			tr cepy, galena	"	690-700	6
7	SB-106	13	21	12	tr galena	"	500-510	7
8	same				tr cepy	"	560-570, 580-590, 610-620	8
9	"				" "	"	670-680, 650-660, 670-680, 680-780	
10	"				malachite	"	650-670, 670-710	10
11	"				tr cepy	"	1020-1030	11
12	"				little py	"	1150-1157	12
13	SB-107	14	22	24	tr cepy	"	500-580, 550-570, 660-680,	700-720 ¹³
14	same				malachite	"	700-710	14
15	"				tr galena	"	720-730	15
16	"				tr cepy	"	730-740, 770-780, 820-880	16
17	"				little py	"	880-890	17
18	SB-112	13	22	15	tr cepy	"	220-275, 290- 315 , 320-	330-335-340
19	same		"	"	" "	"	565-580, 610-615, 625-630	19
20	"				malachite	"	270-275, 280-285, 295-300	20
21	"				" "	"	315-320, 335-345, 400-410	21
22	"				" "	"	600-605, 625-630	22
23	"				tr galena	"	415-420	23
24	SB-113	13	21	12	tr galena	"	210-215, 310-400	24
25	same				tr malachite	"	310-315, 340-345, 355-360,	390-400 ²⁵
26	"				tr cepy	"	740-345, 360 , 365-375,	470-490 ²⁶
27	"				" "	"	505-510, 520-530, 567-572	27
28	"				" "	"	592-598, 608-611, 612-630	28
29	"				" "	"	643-649, 670-680, 685-690	29
30	"				tr malachite	"	695-698	30
31					tr cepy	"	720-725	31

Sheboygan County - Page 3 of 3

	Well # 1	Location T R 2 Sec.	Minerals 3 Geologist	Formation 4	Depth 5	
1	SB-114	14 21 14	tr copy Schwandt tr malachite "	Silurian	180-185, 195-205	1
2	same			"	200-205	2
3	SB-115	13 20 10	tr copy "	"	120-125	3
4						4
5						5
6						6
7						7
8						8
9						9
10						10
11						11
12						12
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14						14
15						15
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31						31

Walworth County - Page 1 of 2

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	Well #	Location			Minerals		Formation	Depth	
	i	T	R	Sec	3 Geologist	4	5		
1	Ww-1	1	18	35	pyrite	Thwaites	Lower Magnesian	810-830	1
2	Ww- same	1	15	33	pyritic	"	Trempealeau	865-875	2
3	Ww- 35	1	15	33	pyritic	"	lower Magnesian	610-620	3
4	same				"	"	Dresbach	part of 785-840	4
5	Ww- 36	1	16	21	much py	"	Trempealeau	857-879	5
6	same				pyrite	"	Frankonia	879-980	6
7	Ww- 39	2	16	1	pyritic	"	Richmond	250-275	7
8	same				"	"	Galena Platt	625-635	8
9	Ww- 40	2	17	19	"	"	Richmond	305-310	9
10	Ww- 51	4	17	15	"	"	Galena Platt	515-525	10
11	Ww- 89	4	15	26	"	Steuerwald	" "	145-160	11
12	Ww- 93	4	15	26	little py	Ostrom	" "	235-247	12
13	Ww- 97	4	15	29	much py	"	St. Peter	275-280	13
14	Ww- 98	1	18	16	little py	"	Niagara	180-185	14
15	Ww- 127	2	16	1	" "	"	Galena Platt	340-345, 515-540	15
16	same				much py	"	" "	545-555	16
17	Ww- 129	2	15	33	" "	"	" "	245-255	17
18	same				" "	"	Glenwood	305-310	18
19	"				much? py	"	Prairie du Chien	425-435	19
20	"				" "	"	Eau Claire	760-770, 825-860, 885-900	900 905 1305 1315
21	"				" "	"	# Mt. Simon	1065-1070, 1095-1100, 1165-1175, 21	21
22	Ww- 539	4	15	4	little py	McKee	Galena/Platt	155-160	22
23	Ww- 591	1	17	5	" "	Roshardt	Sinnipee	670-695	23
24	same				" "	"	St. Peter	720-735	24
25	Ww- 600	3	18	7	" "	"	Magquoketa	220-225	25
26	Ww- 607	2	18	20	pyritic	"	"	205-210, 260-270, 305-320,	3686-
27	Ww- 723	4	18	12	little py	Peters	"	175-180, 185-190	375-
28	same				" "	"	Galena	495-500	28
29	"				" "	"	Decorah	520-525	29
30	Ww- 725	3	17	11	" "	Var Haevu	Magquoketa	195-200, 245-270, 320-330	30
31	Ww- 737	1	17	3	" "	Hartman	Sinnipee	620-640	31
	same				tr malachite	"	Post Turonian, Magquoketa, Sinnipee - parts of each Fm		
	"				tr cpx	"	" "	" " " " "	

tr malachite " Posterior, Neguoketa, Siannipee - parts of each Fr
tr copper " " " " " " "

and Glenwood

Walworth County - Page 2 of 2

	Well #	Location			Minerals	Formation	Depth	
		T	R	Sec.	3	4	5	
1	Ww-744	2	15	13	tr cpy schwandt little py "	Sinnipee	210-215, 270-275, 315-	320, 330
2	same					"	310-330	2
3	Ww-871	4	18	16	tr sphalerite "	"	280-285	3
4	Ww-839	4	18	16	tr Cu sulfide "	Magnoketa	120-125, 150-155	4
5	Ww-724	4	15	3	little? py Massie	Platteville	100-110	5
6	same				little py "	Glenwood	145-150	6
7	Ww-905-X	2	19	11	tr py, more Mobil Oil	Sinnipee	scattered 325-594	7
8	same				" " " "	Ancell Gp	604-605	8
9	Ww-906-X	3	17	14	" " " "	Sinnipee	scattered 450-711	9
10	same				tr sphalerite "	"	520, 695	10
11	"				tr sphalerite?	"	577	11
12								12
13								13
14								14
15								15
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17								17
18								18
19								19
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31								31

Washington Co.

	Well #	T R.E. ²	See ²	Minerals ³	Geol. ³	Formation ⁴	Depth ⁵	
1	Wn 914	12	19	9	Py, Cu-sulfides	Silurian	235-275	1
2				"	"	Magnoletta	325-390	2
3								3
4	Note: all wells report trace Py, Silurian, Magnoletta, Galena-prlle and Pale Chien.							
5								4
6								5
7								6
8								7
9								8
10								9
11								10
12								11
13								12
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31								30
								31

Waukesha Co

	Well #	T	RE	Sec	Minerals Ged. 3 Hartman	Formation	depth 5	
1	WK 1512	5	20	10	Malachite, py, chalc	Silurian	250-300	1
2	WK 1290	226	18	32	" " "	"	105-180	2
3	WK 1102	5	20	1	Py RMP	Galena/PVille (Dev)	665-675	3
4	WK 865	7	19	20	Sphal., Rosenthal	Maplewood	150-155	4
5	WK 862	6	17	3	Chalco ? "	Galena	275-280	5
6	WK 760	7	18	16	Py/Chalco "	Maplewood	260-270	6
7	WK-#1541-X	5	17	2	tr py, marc Mobil Oil	Sinnipee	scattered 290-521	7
8	same				abundant py "	Maplewood	282-283	8
9	"				" " "	Sinnipee	545-546	9
10	WK-1542-X	5	17	33	tr py, marc "	"	scattered 210-469	10
11	same				tr sphalerite "	"	430, 451-453	11
12	WK-1543-X	6	17	10	tr to common py, marc	"	scattered 181-417	12
13	WK-1544-X	6	17	21	" " " " "	"	" 124-375	13
14	same				abundant py "	"	376-377	14
15	"				tr sphalerite "	"	124, 213, 217, 356, 374	15
16	WK-1545-X	7	17	13	tr py "	"	scattered 335-438	16
17								17
18	Note:	Trace amounts Py reported in all wells penetrate Silurian, Maplewood, Galena/Platteville, and Parachute, N. Cleon not present much of Waukesha Co.						
19								18
20								19
21								20
22								21
23		Only newer wells (WK 753 → WK 1547) were examined						
24								22
25	WK-1546-X	8	17	18	tr to common py, marc Mobil Oil	Sinnipee	scattered 112-304	23
26	same				common py "	St. Peter	349	24
27	WK-1547-X	8	18	15	tr to common py, marc	Sinnipee	scattered 293-518	25
28	same				tr sphalerite "	"	293, 296	26
29	"				tr cpy, galena "	"	473	27
30	"				abundant py "	St. Peter	521	28
31	WK-1548-X	8	18	16	tr to common py, marc	Sinnipee	scattered 303-482	29
	same				abundant py, marc	"	421, 487-490	30
	"				tr cpy "	"	364	31
	"				tr galena	"	364, 464	

Kinnelago Co.

	Well #	T R.E.	Sec	Minerals	Geol	Formation	Depth	
1	WI-1	20 17	20	Py	Thwaites	Gal/PV, Pduc C.	65-85 ; 175-195	1
2	WI-9	20 17	21	Py	"	"	110-115'	2
3	WI-18	20 17	21	Py	"	Galena/PV	45-55	3
4	WI-25	20 16	23	"	"	"	128-135	4
5	WI-27	20 17	22	"	"	Pduc C	237-260	5
6	WI-31	18 16	24	"	"	Platteville	125-150	6
7	WI-48	17 16	15	"	Ostrom	"	55-140	7
8	WI-58	20 17	21	"/Chalco	Thwaites	Pduc C	130-210	8
9	WI-59	20 17	28	"	"	"	175-230	9
10								10
11								11
12	Note:	Trace amounts Pyrite reported in most wells which penetrated Galena/Platteville and Prairie du Chien						
13								12
14								13
15								14
16								15
17								16
18								17
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