Lake Superior iron. No. 440 1908

Mead, Warren J. (Warren Judson), 1883-1960
[s.l.]: [s.n.], 1908

W. J. Mead. – 1908.
Lake Superior Iron.

U. S. GEOLOGICAL SURVEY

FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen*. Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand pages is also arranged so that, if desirable, a larger or a smaller scale can be used, eight inches, two inches, one inch, or one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section and the dip and strike when observable, the latter always being expressed from the north; for instance 4025, 250 *N.*, 300 *W.*, *Strike, N.* 78° *E.*, *Dip* 50° *S.* Then follow with a full description of the ledge. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of 2 x 2½ x ¾ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

6—747

W. J. Mead. Origin & nature of Soils (Shaler)
12th Ann Part 1

Madison.

Wis. 440

May 13 08.

Insol Phos. on Vermilion

Mr. Fitzwilliams found in Chandler ore soluble phos = .27 and insoluble phos about .009. The insoluble phos was found to be aluminum phosphate.

Fe = 67.86 Phos. .272 SiO_2 .93 Insol P. .019

Paint Rock from Chandler

Soluble	.014	Insol	.013
"	.059	"	.043
"	.037	"	.061
"	.051	"	.025
"	.042	"	.038

Mr. F. says insoluble phos. increases with Al_2O_3 content.

Phos. always high near walls.

Chandler Ore. 13th level.

Fe.	64.27	Sol. P.	.032	Insol. P.	.140	Moisture	8.00
Fe	61.90	"	.035	"	.075	"	4.40
Fe	62.13	"	.010	"	.100	"	6.15
Fe	65.04	"	.044	"	.120		
Fe	64.43	"	.019	"	.226	"	6.65

Jasper.

	Fe.	Moist
Soudan	30.52	
	29.15	.80
	43.49	
	41.51	
	40.90	.70
	48.37	
	~~57.63~~	
	41.20	.80
	34.64	
	36.32	1.00
	36.58	1.10
av.	38.27	.88

	Fe.	Moist
Chandler	7.77	av. 3.20
	27.74	
	13.72	
	14.48	
	22.71	
	37.18	
	10.97	
av.	19.22	

	Fe.	Moist	Fe.	Moist
Pioneer	37.18	av. 4.00	40.53	av. 4.40
	24.99		26.52	
	16.15		45.72	
	33.22		35.65	
			41.15	
			34.29	
av.	33.48			

Zenith	17.85 27.77 21.67 28.23	Moist 5.70
	15.11 50.21 50.97 36.62 45.63 48.07	Moist 6.50
Av.	~~8~~ 34.21	
Sibley.	12.50	
Savoy.	26.82	

Afternoon of May 13 '08

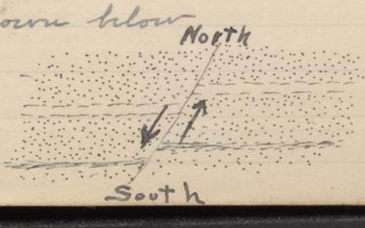
Walked S.E. from Ely.

Greenstone South of High school. ellipsoidal, but not markedly so. Irregular bunches of lighter colored rock common in darker greenstone. About 1/2 mile S.E of High School exposure of jasper, not folded, dipping steeply to the North. strike S.W & N.E. in contact with quartz porphyry on the south. Both greenstone and jasper show more fracturing than the rocks in Sec. 13 & 14.

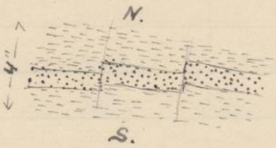
Porphyry apparently intrusive into both the greenstone and iron formation as it contains inclusions of both.

Greenstone amygdaloidal near porphyry.

South of porphyry greenstone is distinctly banded, E & W., and has been rendered schistose. Some bands are distinctly amygdaloidal. Secondary fracturing N.E. & S.W. has produced small offsets as shown below



Stringers of porphyry in greenstone



May 14.

7

Pore space in Vermilion Range. Ores.

Hard Ores — The ores may all be termed "hard ores" in the sense of being hard, rather than earthy hematite. Some of the ores are massive and dense, gray hematite, completely cemented, so as to necessitate continuous blasting in mining. These hard-massive ores are however not without pore space. Numerous openings and cracks, from those microscopic in size to large vugs, are everywhere present, so the porosity varies locally from zero to 40 or 50 percent of the volume of the ore. Pore space determination on typical samples of this grade of ore resulted as follows.

	Specimen -		Mine	Wet.	Dry.	%M.	G.	Porosity
	44125	#1	P	1590	1565	2.2		10
	44126	#2	P	1545	1480	4.5		20
	44127	#3	P	2655	2540	4.5		20
(Paint Rock)	44128	#4		1450	1305	10.0		

S. 7 a T. R.

		Wet	Dry.	% Moist.	G	Porosity
44129	#5	1890	1805	4.5		20
44130	#6	1865	1795	3.2		14.5
44131	#7	1305	1235	5.5		25
44132	#8	1405	1320	6.1		27.1
44133	#9	1765	1640	7.1		32.0
44134	#10	1890	1805	4.5		20.0

Broken Ore.

This class of ore is different from the massive ore only in that it is broken into a rubble of small pieces, ranging

	Dry	Wet	G
44134	471.5	368.7	4.58
44133		556.7	4
44132	976.2	759	4.50
44125	889.7	706.3	4.85
44127	912.4	709.0	4.28
44131	725.2	558.9	4.37
44126	701.4	550.0	4.63
44129	1319.9	1009.1	4.25

... be several ... ze ... v. ... n. ... difficult ... to ... presenting ... fram

the pieces of broken ore and an engineers estimate or actual excavation tests would be the only way in which the porosity could be determined.

Broken Ore.

This class of ore is different from the ... oken ... ranging ... eneral ... ize ... o. ... n. ... difficult ... hand specimens properly representing the porosity. The voids occur between the pieces of broken ore and an engineers estimate or actual excavation tests would be the only way in which the porosity could be determined.

	Dry	Wt.	G.
44130	533.3	417.1	4.59

W.J. Mead

W.J. Mead

S, ETC.

CONTENTS.

Broken Ore.

This class of ore is different from the massive ore only in that it is broken into a rubble of small pieces, ranging in size from powder, to chunks several inches in diameter. The average size is about 3/4".

Average Sibley ore 30% will pass 1/4" sieve.
test made by Fitzwilliams.

Zenith ore 10% will pass 1/4" sieve.

Pioneer " 5% " " 1/4" " .

The porosity of this broken ore is difficult to obtain. as it is impossible to obtain hand specimens properly representing the porosity. The voids occur between the pieces of broken ore and an engineers estimate or actual excavation tests would be the only way in which the porosity could be determined.

S. T. R.

Nr. ~~44136~~ 45

following pages.

Iron Carbonate. Zenith Mine Specimens 44136 ~~to 44145~~ ~~44136~~

Siderite occurs rather abundantly in the lump ore, cementing the pieces and lining small vugs. It is almost always botryoidal and has much the same appearance as botryoidal hematite.

44150 Paint rock. Soapy. (Altered Greenstone)

44151 Typical Pioneer brecciated ore.

44135 Iron Carbonate, Vermilion Range

May 18. 1908

Cu. ft per ton.

Figure used by engineers is 10 cu ft per ton. This is thought to be a little large on account of rock and paint rock.

Ore in stock pile goes 14 cu ft per ton.

Pore space varies from zero to 50%

Phos

Chemical survey maps of the mines show no regularity in the distribution of phosphorus. The only conclusions that can be drawn are

Low phos occurs in largest ore bodies?

High phos. is more likely in the small shoots of ore away from main body.

Phos does not go higher near paint rock in fact bears no relation to paint rock apparently.

Gradation from Jasper — In Zenith mine, ore preserves structure of jaspers. in folds. The separate layers of hematite are separated by porous layers. Ore all breaks up on mining.

Quartz. — Large masses of crystalline and amorphous silica are abundant often coloured with iron. Quartz occurs coating hematite and hematite on quartz.

Greenish paintrock from Sec. 30.

Fe 36.06 P. .097 SiO_2 34.10 Mn .54

White Iron. – Cyrille Fortier –

– Fe 50.49, P .058 – SiO_2 – 15.56 – Mg .18
69.30 .019 .40

Section 30		P.	SiO_2	Mn	S
	66.62	.128	2.30	09	1.0
Jasper	36.47	.025	20.35		

Greenstone	Fe	P	SiO_2	Mn.
Pioneer Shaft.	30.90	.074	23.33	.16

Small pile 153 tons of off grade ore from Zenith mine was stocked in 1901.

When stocked	64.93	.088	3.97	In 1901
	64.65	.056	3.37	In 1908

May 19.

Soudan hill. with Mr. Jeffries. chief clerk.

44146 Typical ore

44147
44148 Specimens showing quartz deposited from solution

44149 Altered greenstone

44137
~~44150~~ Copper minerals, Soudan hill.

Four or five years ago Elba mine shipped 3000 tons, 25% manganese.

Biwabik, May 21.

Called on Mr. Fred Leach.

Phos. Mr. Leach described the following occurrence in Bess. ore. Ore from a certain mine ran very irregularly in Phos. differences in ten points phos occurring in samples from same place. To locate the difficulty Mr. L. washed some of this ore and separated the coarser parts according to color. He found by elimination, a yellowish green phase containing 2% phos.

Mr. Leach believes that as a rule the phos in Mesabi ores does not occur as apatite but probably as iron phosphate with some aluminum phosphate.

Artificial Leeching of Phos. Mr. Leach does not believe that actual leeching of phos. occurs in the reported cases of stock pile leeching &c. He says that the high phos is in the fines and that by exposure to weather the fines are washed out mechanically. This would apply to the case at Chy. (P. 13)

May 22. 1918.

Mt. Iron. Mr Gordon

Phos. #8 Hard core Fe 61. Phos. .077 Mn. .12 SiO_2 1.46

#9 Soft outside Fe 57.98 P. .118 SiO_2

Sol. .50 Insol. 2.37

The above analyses apply to a specimen of Mt. Iron ore. with a hard core #8 and soft yellow exterior #9.

	Screen.	Fe.	P.	Fe.	P.
Structure test.	caught on 1/1	65.56	.064	62.62	.097
	" 1/2	60.60	.114	58.90	.071
	" 1/4	62.46	.106	59.99	.089
	1/8	61.84	.123	60.14	.081
	1/16	60.30	.116	60.30	.090
	1/30	61.07	.120	60.45	.105
	60	63.70	.091	62.93	.080
	100	65.72	.063	64.95	.077
	pan.	64.48	.080	64.79	.070

Olive Mine.

S. T. R.

Fred. Roberts - Corrigan McKinney	6	5	4	3	2	1
Phil Shaw - Chemist.	7	8	9	10	11	12
Geo Whiting - Iron River	18	17	16	15	14	13
	19	20	21	22	23	24
Albert Myers Pewabic Min.	30	29	28	27	26	25
	31	32	33	34	35	36

C. W. Hughes Hemlock Min.

Whitesides Exploration Co Duluth.

Started drilling Dec 1907, 2nd. Mar. 3rd. June.

Will start exploration shaft in Jan 1908.

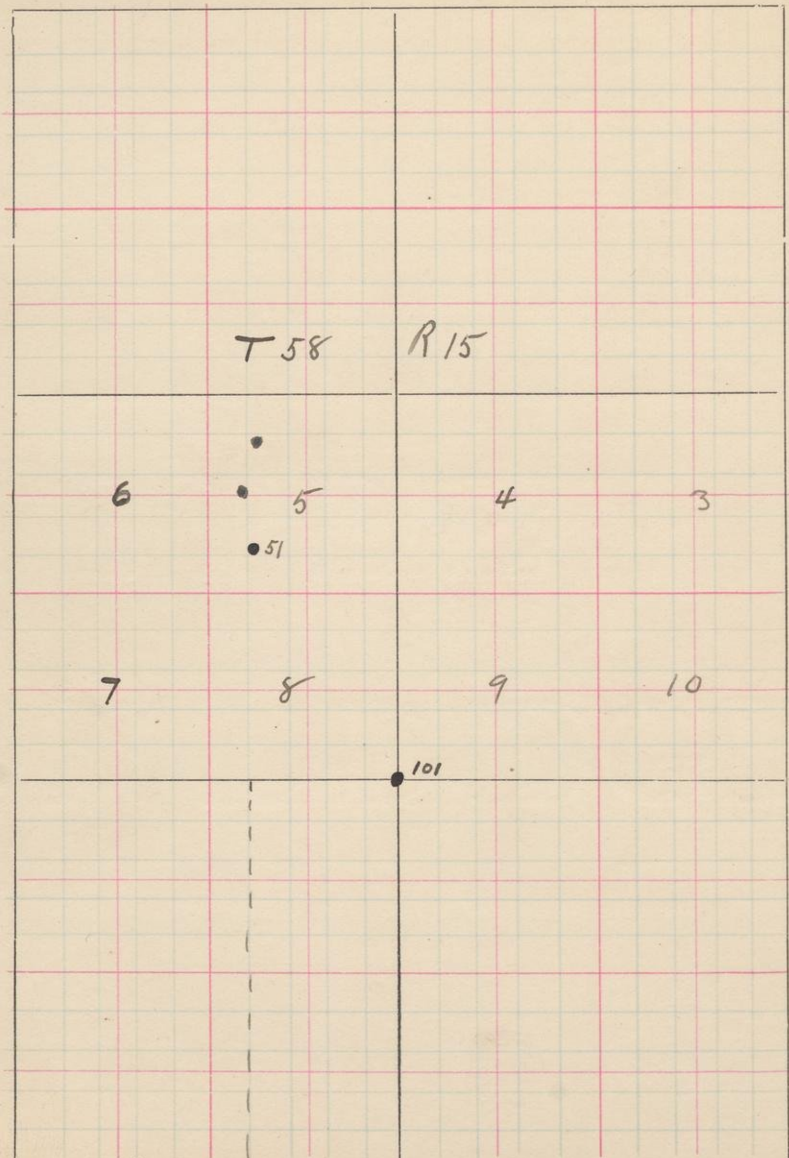
Exploration started at old Copps Place.

E. a. Ormes.

Copps Ex on ~~22~~ 23-~~R~~43, T47 worked over on to next section west.

Olivn hold option in 47-43.

S. T. R.



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Mr. Jewitt. May 25. 08.

Thickness of Iron Form.

Hole 51. Elevation 877.4
Surface. 292.
~~Slate~~ 292-603
Iron form 603-1228
Qtz 1228-1263

Hole 101 Elevation 829.1
Surface 144.
Slate 144. 1495
Iron Form. 1495

#208 Surf. 272
Iron fm. 272-480

252 Surf - 225
Nr qtz.

S. T. R.

For detailed numbering of speci-
mens mentioned below see
pages 36 – 42 inc.

#44219 – 44269 Core samples from drill hole
~~#101-57-22~~ #101 - Sec 25-57-22
supplied by E. J. Longyear.

#44284 to 44323 Core from hole #301 - 24-57-22
from E. J. Longyear

#44324 to 44345 Core from hole # 1 -19-58-16
from E. J. Longyear

See #44346 & 44379 for further drill
hole samples.

May 25.

Discription of Hole # 101.
S.E. corner of Sec 8 T. 58 R 15.

Total depth = 1858
Surface 145, Slate. 1347
Iron Form. 511 Quartzite. —

From 148 to 1495 Virginia slate
At depth of 630' intrusive granite
about ——— feet thick

44152 Specimen of intrusive granite.
44153 Virginia slate near granite contact.
4 " " Quartzite phase. 965'
5 " " Banded 1075'
6 " " 1450
7 " " 1491

From 1495 to 2020 Iron Formation
8 Iron formation immediately below slate 1800'
9 " " 1527
44160 " " 1543
1 " " 1550
" " Black slate 1828 - 1858

44101 Representative collection of iron formation
core from above hole.

S. 21a T. R.

44162	Greenstone with associated iron formation. Lucky-Boy – Anderson Property, Sec. 4+5, 62-12, + " 33, 63-12 Minn.
44163	Ore Breccia, American Mine, Mesabi Range, Minn.
44164	Taconite, La Rue Mine Mesabi Range, Minn.

May 26.

~~Sellers & Burt pits~~..

Decayed Bowlder from stripping in
44165 Outside Sellers Mine
44166 Inside

44167 Peculiar phase of Iron formation
at Morris pit.

44168 Altered Iron-formation slate
Morris pit.
44169 Limonite with core of hard
ore
Analyses.

44170 Granular ore, containing
large concretions, giving it
a conglomeratic appearance

44171 Granular Jarit rock. Morris

44172 Yellow ore "
44173 Hard Ore near 44172 "

McEachren chemist Pickands Mather,
Caspian Mine Office.
Mr. Woodworth Engineer same place,

Mines operating, James, Caspian Baltic, Fogarty,
Baker, Bawass, Kinney,
Commonwealth (4 Shafts)
Cleveland C. have started shaft near Stambaugh
station.

Crystal Falls Dec 30.

In Great Western Mine, 800 ft level. drill hole run out under swamp gives strong mineral water. high in Magnesium sulphate and potassium chloride.

Fairbanks ore full of Graphite.

	CaO	MgO
Western.	1.49	.94
Tobin	2.30	1.35

Iron SiO_2 Al_2O_3 Ca. Mg. MnO Vol. Phos.

Empire Ore, Marquette

av. Sp. Gr. Empire Ore	3.33 1/3
" wt. cu. ft. in place	208 = 10.8 cu ft.
" " " broken	125# = 18 " "

Oliver I. Co.
Iron. Mt. Jan 2.

Cu. ft. per ton. Engineers use figure of 10 cu. ft per ton in place and 15 cu ft. for first class ore loose.

(1908)	Iron	Phos	Silica	Mang	CaO	Al_2O_3	S.	MgO	Vol.	Moist
Chapin	59.85	.063	5.70	.23	1.40	1.21	.005	2.68	2.70	6.29
Ajax	51.25	.059	15.30	.26	1.70	1.75	.007	3.71	3.50	6.54
Crescent	57.90	.033	3.80	.18	3.10	.95	.019	3.18	5.70	7.13
T.S. Granada	59.33	.062	7.48	.16	.95	1.72	.013	2.88	2.16	7.40
" B.H.	59.90	.055	6.12	.16	.91	1.54	.022	3.38	2.34	5.79
Cadiz	51.82	.057	16.92	.15	.97	2.02	.012	3.34	2.44	5.76
Barton	55.50	.619	6.88	.18	.82	4.35	.124	.83	6.35	6.33
Dotrel	56.22	.620	5.59	.25	.74	4.37	.105	.81	6.10	3.19
Clearfield	56.37	.120	8.05	.16	1.43	4.98	.161	1.91	2.80	13.22

1
2

S. T. R.

E. E. Brewster

6—747

Cremer & Bicknells Met. Handbook
now Cremer & Case.

Anglin ~~Hard~~.	7.4
" Hem.	10.4
Aragon	10.
Ashland	9.
Badger	12.3
Chisholm	10.
Commonwealth.	12.
Montreal	11.5
Republic.	7.0

Miscellaneous Specimens

44174 Breccia cemented with vein quartz and pink feldspar. From quartz vein, in greenstone, 1 mi. east of Clowry, Marquette Dist., Mich.

44175 Specimen showing granules of hematite in chert ~~neg~~ between Amasa and the Gibson Mine, Crystal Falls Dist., Mich.

44176 Ferruginous chert, Baltic Mine Iron River Dist.

44177 Amygdaloid, near Gibson Mine, Crystal Falls Dist.

44178 Breccia, Baltic Mine, Iron River Dist.

44179 Granular chert, sheared, same locality as 44175.

44180 Low grade ore, Caspian Mine.

~~44181~~

S. T. R.

44188 vacant

44199 vacant

Specimens from Rudolph, Wis.

44181(6) Altered greenstone. From a pit near a well.

44182(2) Sandy material, probably altered rhyolite.

44183(4) Altered greenstone.

44184(") Ferruginous quartzite.

44184(?)
44185(7) From dump at pit. Probably altered greenstone.

44186 Ferruginous quartzite. Float in Sec. 8.

44187(5) Altered greenstone showing concentric weathering.

~~44188~~

44346 to 44379 Drill core samples from hole # 2 Sec 19-58-16. from E. J. Longyear

44270 to 44283 Drill core samples from hole # 107- Sec 25-57-22 from E. J. Longyear.

44190 Specimen from dump of
Mine, Marquette district showing
cementation by iron oxide from
leaching of iron carbonate after
material was put on dump.

44191 Specimen from dump of
Mine showing peculiar forms of
hydrated iron oxide.

44192 Specimen from Sec — near
railway, east of Michigamme
metamorphosed lean ore.

44193 Limonitic ore, Emperial Mine,
Marquette Range.

Michipicoten district, Ontario
September 1907.

#44200 Large boulder of very basic igneous rock in bed of Boyer Lake.
The boulder, previous to the draining of the lake had been covered with water and altered by the acid (H_2SO_4) water of the lake. Spec. 44200 is the solid portion of the outer part of the boulder. Note the pitted surface caused by leaching.
Lying on the boulder was three or four inches of green alteration product from the decomposition of the boulder
44201 specimen #44201

44202 Limonitic ore or ochre from the bottom of Boyer lake, north end. There is a large amount of this material evidently leached from the carbonate rocks and deposited in the lake.

44203 Limonitic material deposited from waters of Boyer lake, incrusting rocks at water level.

44204 Oxidized and leached cherty-iron-carbonate rock from rockwall of Boyer lake (below water level) Shows action of sulfuric acid solutions. The peculiar "geodal" structure is not original but represents a segregation of iron oxide on the surface of the rock. the inner part of which is leached.

44205 Cherty iron carbonate altered by waters of Boyer Lake. South of boiler house.

44206 Banded cherty iron carbonate rock. showing leaching of carbonate layers. Same locality as 44205

44207 Completely oxidized cherty iron carbonate rock. Helen Mine.

44208 Cherty iron carbonate showing oxidation of iron carbonate

44209 Specimens of cherty iron carbonate from which iron carbonate has been leached. Hill north of Helen Mine.

44210 Phase of iron formation rock Helen Mine. Showing softening of chert to sugary quartz.

44211 White sugary quartz. Iron formation Helen Mine.

44212 Ore. Helen Mine.

44213 Iron Sulphide, Helen Mine. This material occurs in pockets in the iron formation

44214 Pyritic sideritic chert. south end of Boyer lake.

44215 Altered pyritic chert. south end of Boyer lake.

44216 Iron pyrite. Outlet of Boyer lake.

44217 Pyritic chert, slightly altered.

44218 Banded ferruginous chert showing slight leaching of SiO_2.

Hole 101, Sec. 25, 57-22

Presented by E. J. Longyear.

44219	139 - 143	
44220	143 - 148	
44221	148 - 153	
44222	153 - 160	
44223	160 - 165	
44224	165 - 172	
44225	172 - 177	
44226	177 - 181	
44227	181 - 186	
44228	186 - 191	
44229	191 - 198	Cuttings
44230	191 - 198	Core
44231	198 - 202	
44232	202 - 206	
44233	210 - 214	
44234	214 - 220	
44235	220 - 228	
44236	232 - 239	
44237	239 - 246^{6}	
44238	246^{6} - 253	
44239	253 - 263	
44240	263 - 271^{6}	
44241	271^{6} - 280^{8}	
44242	280^{8} - 288^{6}	

Hole 101 Cont'd.

44243	288^{6}	to	297
44244	297	—	302^{8}
44245	302^{8}	—	311
44246	311	—	318^{6}
44247	318^{6}	—	327^{10}
44248	327^{10}	—	333^{2}
44249	333^{2}	—	336^{2}
44250	336^{8}	—	343^{3}
44251	343^{8}	—	347^{5}
44252	347^{5}	—	355
44253	355	—	362
44254	362	—	368
44255	362	—	368
44256	368	—	378
44257	378	—	388
44258	378	—	388
44259	388	—	397^{8}
44260	397^{5}	—	403^{4}
44261	403^{4}	—	412
44262	403^{4}	—	412
44263	412	—	417
44264	417	—	426^{6}
44265	433	—	441^{6}
44266	441^{6}	—	448^{3}
44267	448^{3}	—	455^{6}
44268	455	—	460^{6}
44269	460^{6}	—	462^{5}

Hole #107, 25, 57-22

Presented by E. J. Longyear.

44270	177 to 184	
44271	184 — 193	
44272	193 — 202	
44273	202 — 212	
44274	212 — 220	Cuttings
44275	212 — 220	Core
44276	220 — 229	
44277	229 — 239	
44278	239 — 247	
44279	247 — 257	
44280	257 — 267	
44281	267 — 277	
44282	277 — 284	
44283	284 — 293	

Hole #301, 24, 57-22

Presented by E. J. Longyear.

44284	86 — 90
44285	90 — 95
44286	95 — 100
44287	100 — 105
44288	105 — 110

Hab #301 Cont'd.

44289	110 - 115
44290	115 - 120
44291	120 - 125
44292	125 - 130
44293	130 - 130 1/2
44294	130 - 132
44295	132 - 133
44296	133 - 136
44297	136 - 147 2/12
44298	147 2 - 150
44299	169 - 171 9
44300	171 9 - 185 9
44301	185 9 - 195 10
44302	195 10 - 202 1/12
44303	202 1/12 - 211 6/12
44304	211 6/12 - 220
44305	220 3/12 - 226 3/12
44306	226 3/12 - 235
44307	235 - 241
44308	241 - 248
44309	258 - 262
44310	262 - 266
44311	266 - 271
44312	271 - 279
44313	279 - 286

Hole #301 Cont'd

44314	286 – 291
44315	291 – 299
44316	307 – 308
44317	308 – 312
44318	314 – 325
44319	325 – 328
44320	328 – 336
44321	336 – 343
44322	343 – 352
44323	352 – 357

Hole #1, 19, 58-16

Presented by E. J. Longyear.

44324	94 – 100
44325	100 – 105
44326	105 – 107
44327	107 – 113
44328	113 – 130
44329	130 – 146
44330	146 – 171
44331	171 – 193
44332	193 – 209
44333	209 – 219
44334	219 – 229

Hole 1 Cont'd

44335	229 - 239
44336	239 - 249
44337	249 - 255
44338	255 - 263
44339	263 - 273
44340	273 - 278
44341	278 - 284
44342	284 - 287
44343	287 - 294
44344	294 - 300
44345	300 - 308

Hole #2

44346	75 - 84
44347	84 - 88
44348	88 - 90
44349	90 - 100
44350	100 - 106
44351	110 - 120
44352	120 - 130
44353	130 - 140
44354	140 - 150
44355	150 - 160
44356	160 - 170

Hole 2 Cont'd

44357	170 – 180
44358	180 – 190
44359	190 – 200
44360	200 – 210
44361	210 – 220
44362	220 – 230
44363	230 – 240
44364	240 – 250
44365	250 – 260
44366	260 – 270
44367	270 – 280
44368	280 – 290
44369	290 – 300
44370	300 – 308
44371	308 – 324
44372	324 – 336
44373	336 – 348
44374	348 – 362 6
44375	362 6 – 369
44376	369 – 370 6
44377	370 6 – 372
44378	372 – 376
44379	376 – 378

44380 to 44386 — See letter from O. B. Warren, Dec. 23, 1908. (Attached)

44380 - 44386 inc.

OSCAR B. WARREN
HIBBING, MINN.

Survey number indicated
W.J.M.

Hibbing, Minnesota, December 23, 1908.

Mr. Warren J. Mead,

Madison, Wisconsin.

Dear Mr. Mead:--

Replying to your recent favor acknowledging the receipt of the analyses of the iron carbonate and asking for some samples which will show what I have called original iron carbonate and also what I have called the material which possibly contains volcanic ash. I am sending you by mail a few pieces of core which were taken from the specimens I have in my office. These specimens are occasional pieces I received during the time the drilling was going on. Our complete specimens are at Palmer, Michigan.

These specimens are all marked and will be referred to by number.

Those specimens which show the quartzite phase of the iron carbonate are No's. two #44381, part of three #44382 and also six #44385. These specimens show blackish, glassy crystals bedded in a greenish material and to me they do not show any very great alteration but look like specimens of a rock which has not been subjected to any alteration.

No's. one #44380 and four #44383 show the material which I thought contained volcanic debris. This is also shown in a small way in number three and we had a large amount of material similar to numbers one and four in hole 112, out of which number three was taken.

Specimen number five #44384 shows the material I have called magnetite-grunerite-schist.

Number seven #44386 is material I have called magnetic cherty iron carbonate.

Am also sending you a fragment of the diorite found in what was supposed by me to be a layer of diorite through which the vertical drill hole passed, this hole being located 500' West of the South quarter post of section 29, 47-26, on the line between sections 29 and 32. A long time ago I sent Mr. Leith a large piece of this and he determined it as diorite but did not make a slide of it.

You understand, as I have told you, that I have never had any training in geology and only a limited amount of mineralogy and have no means of accurately identifying the rocks through which we have drilled. My remarks are only assumptions. I have thought it possible that the magnetic iron found in such specimens as are sent you may possibly have been either the direct product of volcanic ash and dust which settled in the sea or this material may have been washed down into the sea by waters acting on exposures of magnetic rocks. Such a specimen as number one shows so mottled an appearance that it seems possible that these rocks were derived directly from large quantities of fresh volcanic material, while a specimen like number five looks like the rock it represents was built up by the same process as the sands of the coast of Labrador and some parts of the shores of Lake Huron are being built up.

On these specimens are marked the analyses. These analyses represent the analyses five foot samples with the exception of number two #44381 which is half of a piece of core, the other half having been analyzed by Lerch Bros. and determined as iron carbonate with the iron and silica as shown.

You will understand that I am very greatly interested in the origin of the rocks of the Palmer District and as you have offered to be of assistance, I wish you would kindly look over and criticise the report I wish to make to my people on the geology of the Platt Mine area. If you take exceptions to anything, please state definitely wherein I am in fault, as I shall be very glad to be corrected.

Thanking you in advance for this favor, I beg to remain,

Yours very truly,

O.B.C[signature]

OBW-L

Harding - Smith. - Adams - Spruce.

T. F. Cole.

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