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Superior region [with H.E. Wood and W.J. Mead]. No. 425 summer of 1907

Leith, C. K. (Charles Kenneth), 1875-1956
[s.l.]: [s.n.], summer of 1907

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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 $2 \times 2\frac{1}{2} \times \frac{3}{4}$ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of $3 \times 4 \times 1$ 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.

[#]
Notebook 425

C. K. Leith, summer of 1907:

Michipicoten Dist (with H.E. Wood)

Gogebic Range (with W.J. Mead)

Mesabi " " " "

Western Vermilion (60-22 etc) Minn.

S.

T.

R.

#252

#251

W. 811

S. 225

2.

W. 877

S. 167

S. 2.

2.05

0

W. 767

S. 130

T. 95

2 30

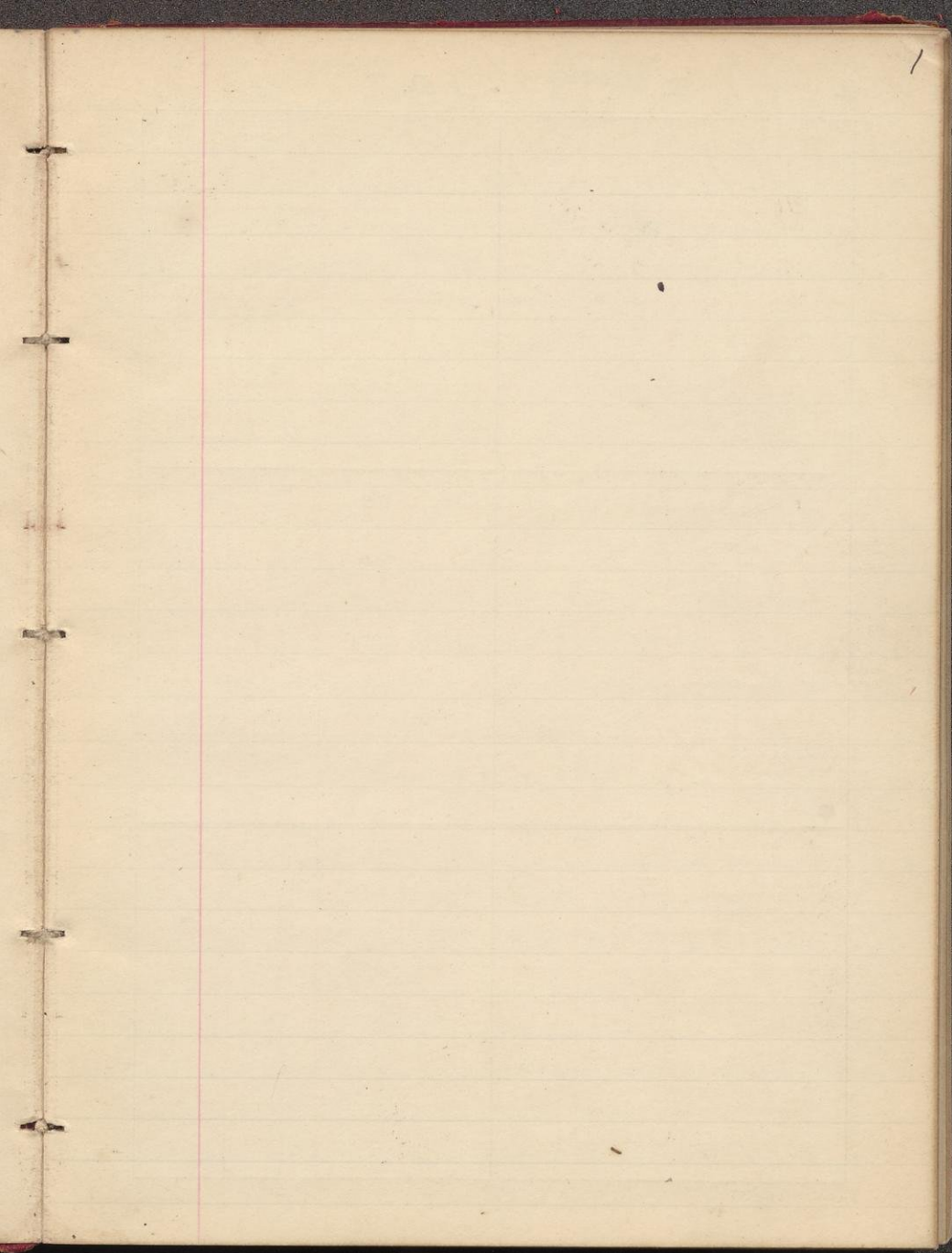
.51

W. 877

S. 292

P. 908'

2.



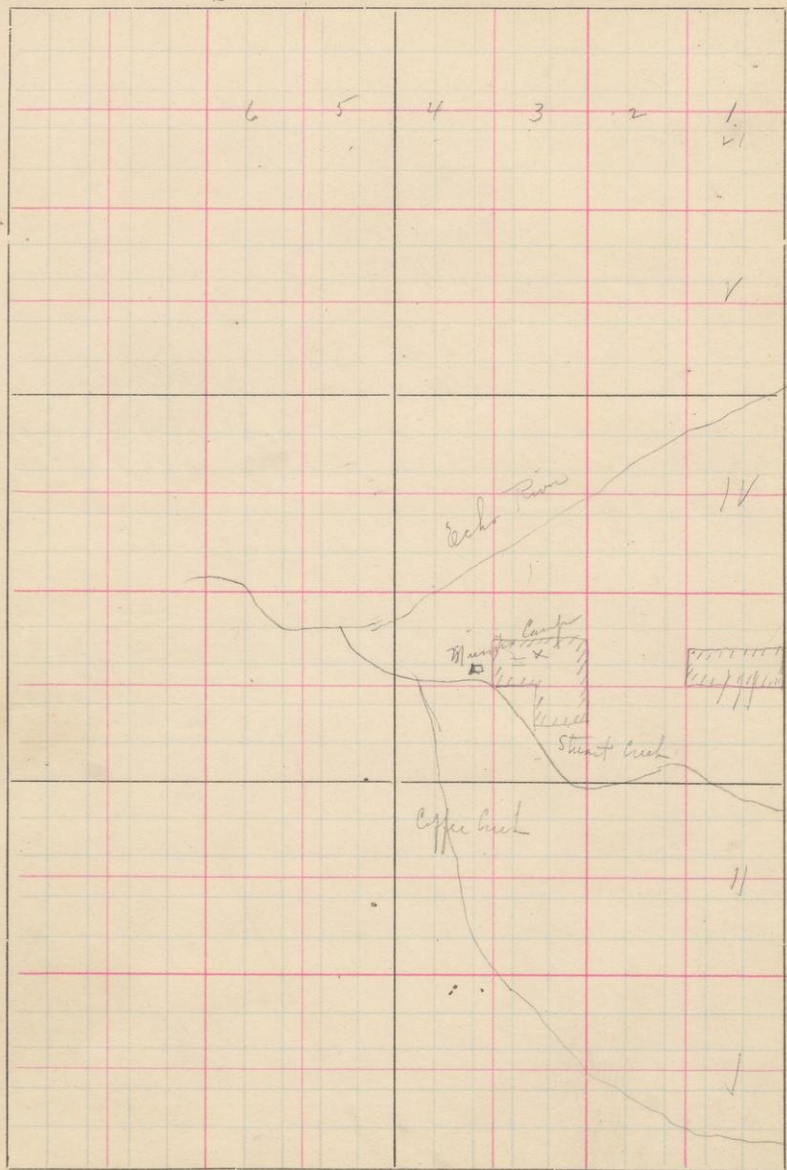
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Gogebic Range

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h 300' x 1 ~ ~ ~ ~ ~ 1 x 6 x 6 ~ ~ ~ ~ ~
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~ ~ ~ ~ ~ 300' 1/2 x 2 3/4 c. p.
1 ~ ~ ~ ~ ~ 2 x 7, 3 x 1 1/2 ~ 2 1/2 x
~ ~ ~ ~ ~ 1. 70' x 1. 61' 35'
16 ~ ~ ~ ~ ~ 7. 6 ~ ~ ~ ~ ~
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
~ ~ ~ ~ ~ 5' ~ ~ ~ ~ ~ 15' ~ ~ ~ ~ ~
~ ~ ~ ~ ~ 20' ~ ~ ~ ~ ~ 40' x 40' ~ ~ ~ ~ ~
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7 ~ ~ ~ ~ ~ 35' ~ ~ ~ ~ ~
15' ~ ~ ~ ~ ~ 60% x, 2 ~ ~ ~ ~ ~
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✓, 6

1024

72 2. 22 x 60 7/2 1-1-1

12547. / L. Lx

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$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

→ 2.76.24 h - ✓ x

2022 x 100 = 100%

79.5 CV to $\frac{1}{2} \times 71 = 35.5$

0-2 x 6 1/2 - 7 - 10 - 12

164

S.

T.

R.

$$\begin{array}{r} 0.21 / 282.675 \\ 562 \\ \hline 884 \end{array}$$

St. James 29-56-24

W. W. W. / A. Jun 9

W. W. W. - 6000 { W. W. W. 1000

W. W. W.

W. 42.67

T .084

SO₂ 21.94

W₂O₃ 5.05

CO .15

47490

W. W. W. - 58-15

W. W. W. - 1000

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900 W. W. W. - SW SW - 3-58-15

S 85

S 200

T 118 403

> 455

W. W. W. - 1000

W. W. W. - 403

1200 W. W. W. - 1000

S. 83

S 119

T 65 ~~34~~

TPR 78

> 35

W. W. W. - 1000

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S.
W 210

T. 58

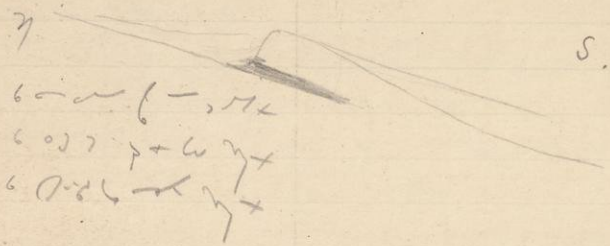
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507000

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0			56-50	5-58-13
40			S. 292	
			8p 56	
			4p 255	
			4p 470	
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			L-130 10	
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			6+6p 80	
			8p 1-576	
			L-1-651	1672

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850' 9' ~ ~ ~

7
6-~ 6-~ ~
6000 p+w y x
6000 ~ y x



~ ~ ~ ~ ~

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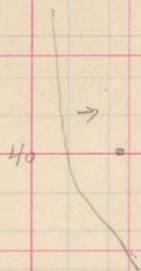
57-21+22 ~ ~ ~ ~ ~

1st Chair (R h) x ~ ~ ~ ~ ~
~ ~ ~ ~ ~

Michael

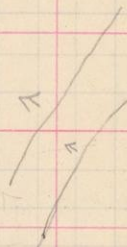
Miller

6-7-17



40

40



Dies - Tube 10-2-17x

40-17x

Halogen 40-17x

S.

T.

R.

7 ~ St Clair Jr. June 8

47491 - 47500 3-58-16 60-2 x 1/2 in

5, 223

Sl. 132 (12, 26, 12, 12, 12, 12)

T 225

Sp. 36

2' 44" Hills = x 66 ft. 6" 75 ft. claim

K_2 25.23 34.62 25.88 29.83

SiV₂ 46.74 15.35 44.56 48.63

Al₂O₃ .32 1.60 1.17 .95

4749/A

47491 A

4749/B

28-59-14 r \

St Clair, Oct 27, 1860.

216-26x

St. Clair Jr June 8

S.

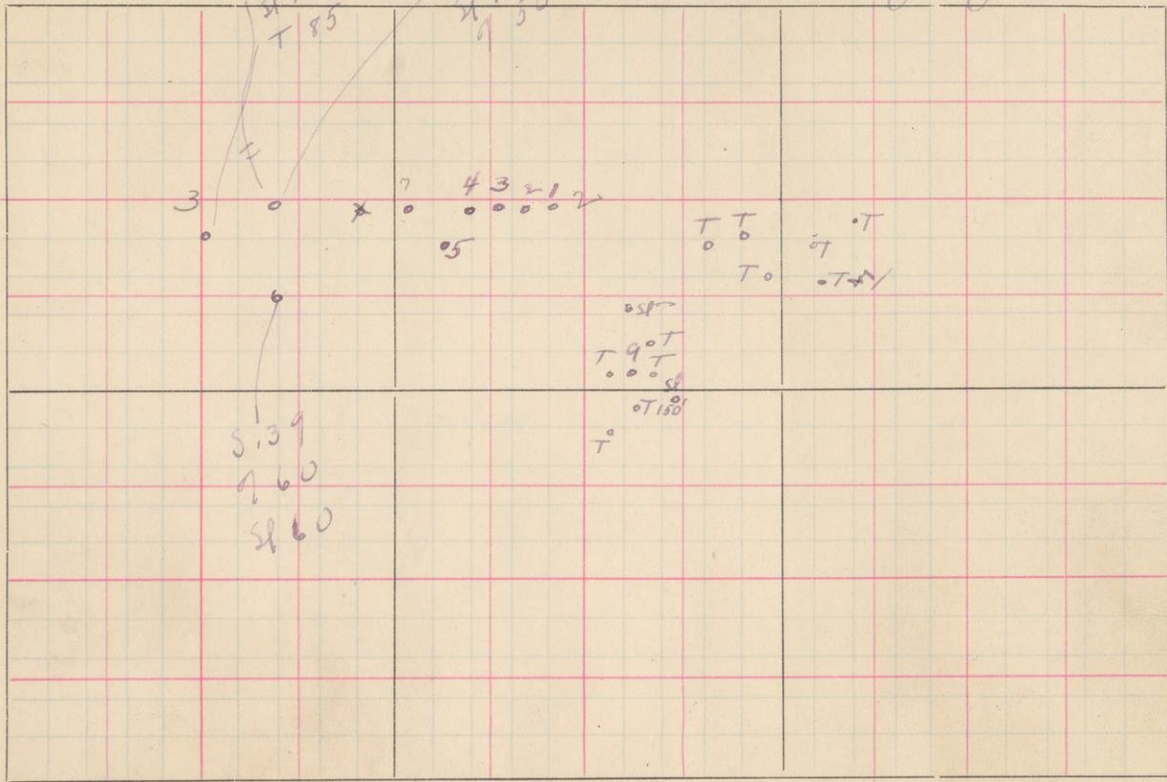
T.

R.

16

58

6-717



#1	58-16	#2	#3
	S. 35'	52	60
	sl 84	58	42

#4 S. 49
 7. 90
 sl + 9.87
3-23}

#5 S. 32
 T 158

#6 S 40
 T 3
 sl 23

#7 S. 40
 T 50
 3.8 1/2

#8 S 80
 T 43
 T 10

#9
 S. 122
 T 42

/ 13

"7 y. Same, Cook & Hamilton - - - - - Washburn

Same

7 y. Same - - - - - 7 x 2

Cook

7 y. Same - - - - - 7 x 2

7 y. Same - - - - - 7 x 2

Hamilton

7 y. Same - - - - - 7 x 2

Washburn

7 y. Same - - - - - 7 x 2

S.

62-12

T.

F.

24

23

22

0-747

62

61

60

G. 647

$$K = 2 + 1 \frac{1}{2} = 3 \frac{1}{2}$$

$$y = 33.40\%$$

$$40\% \times 1.57\% \times 1.50 \times 1.2 \times 1.9\% \times 1.5$$

$$2 \times 1.28 \times 1.7 \times 1.2 \times 1.5$$

$$1.7 \times 40\% \times 32 \times 1.7 \times 1.7$$

$$\textcircled{E} \times 1.5 \times (3) \times 122 \times 60 \times 1.5 \times 1.5$$

$$1.2 \times 1 + 2 \times 1.22 + 3 \times (-2) \times 1.5$$

$$Q \cdot A \times P \cdot L$$

$$\text{Edwin L. Lewis} \rightarrow 1.5 \times$$

$$60.22 \times 1.5 + 1.5$$

SPECIMENS COLLECTED BY E. T. HANCOCK,
JANUARY, 1908, FROM QUINCY AND WINONA
MINES, KEWEENAW POINT, FOR ANALYSES TO
SHOW THE COMPOSITION OF FRESH BASIC ROCKS
IN THE COPPER DISTRICT AND THE EQUIVALENT
ALTERED PHASE NEXT TO THE COPPER ORE AT
DEPTHS PRESUMABLY BEYOND THE REACH OF
RAPIDLY OXIDIZING WATERS.

Pair 1.

- 47499 A. Rock from near center of lode
7th level, Winona Mine.
- 47500 B. From footwall 70 feet from
lode, the longest cross cut away
from lode in the mine. Winona
Mine.

Pair 2.

- 47501 A. From 10th level, in hanging
wall, just off from the lode.
Winona Mine.
- 47502 B. From 10th level in hanging
wall 15 to 20 feet from the
edge of the lode and as far in
the hanging wall as the cross
cut was run.

Pair 3.

- 47503 A. 25th level, just off from the
vein on the footwall side,
Quincy Mine.

Pair 3. (Cont.)

- 47504 B. 25th level, from 12 feet in
foot wall near 1, Quincy Mine.

Pair 4.

- 47505 A. 63rd level, just off from the
lode in foot wall, Quincy Mine.
- 47506 B. 63rd level, from 12 feet from
lode in foot wall, Quincy Mine.

Concentrating tests. Mpsate. Hunt.

71.75% 2.1 x 2.1 x 2.1 x
 71.75% 2.1 x
 6.1 x

41 53

43 57

7.10% 7.82 12.26 6.64

Mps 2 1/2, 37.0 1.1, 1.1 x 6.6 0.4. Mps 1/2

Zoneths Kamea C

16.7 13 7.7% 6.6 2.1 x
 16.7 13 7.7% 6.6 2.1 x
 16.7 13 7.7% 6.6 2.1 x
 16.7 13 7.7% 6.6 2.1 x
 16.7 13 7.7% 6.6 2.1 x

Houghton with Limer July 21, 1905

1. y. d. A + m. y. r. m. l.

② m. - y. b. x 67. b. l. m. l.

③ j. z. b. - m. - y. l. b. l.
b. A. m. x

y. m. l. m. x + m. l. l.
c. c. 17 y. b. l. x

m. - y. y. l. m. x l. m. - m. x

1. y. l. m. y. b. l. m. y. m. - k

s. - l. l. 1, 4 l. x k. o. l. m. 10° w. l.

40° x. s. t. m. y. y. l. m. 70° e. l. 15° y.

m. m. m. l. m. x b. l. k. b. s. x

b. l. v. k. - m. y. x

m. m. c. 800 x. v. m. 10° l. m. l. x

m. l. m. - k. y. k. m. x x

July 22, Saxon, Nis

[illegible]

21. C. Sax. 68, N.A.
2. K. g. 7' Bront x 1 3/4 520
6. P. 6 L. 5, 2x

750, 519, 618, 717, 816, 915, 1014, 1113, 1212, 1311, 1410, 1509, 1608, 1707, 1806, 1905, 2004, 2103, 2202, 2301, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000.

July 23 Ashland

$\frac{1}{\sqrt{2}} \left(\begin{array}{c} 1 \\ 0 \\ 0 \\ 1 \end{array} \right) = \frac{1}{\sqrt{2}} \left(\begin{array}{c} 1 \\ 0 \\ 0 \\ 1 \end{array} \right)$

NOTES TAKEN BY C. K. LEITH ON TRIP TO
LAKE SUPERIOR REGION WITH STUDENTS IN
GEOLOGY AT THE UNIVERSITY OF WISCONSIN,
April 30th to May 10th, incl., 1909.

Keweenawan. Note thickness of the
Keweenawan conglomerate as evidence of
terrestrial origin. Cross bedding. Round
ing of smallest grains. Absence of
graphitic material in the Keweenawan.
Irregularity of interlamination of
shales. Micaceous characteristics of
shales. Mud cracks and very irregular
false bedding. Similarity to the Con-
necticut Triassic, according to Mans-
field. Scattered pebbles.

Marquette district. Contrast in two
kinds of iron formations at Michigamme --
lower, specular jaspers; upper, am-
phibole magnetite rocks. Garnet and mica
and chlorite in local areas, perhaps
near dikes. Intrusives represent sills
within the iron formation. Intrusions
took place later than the Goodrich
conglomerate, as shown by pebbles in
conglomerate and as shown by cleavage in
the greenstone dipping steeper than the
conglomerate.

The concentration of the ore in the
Negaunee formation took place before there
was much folding.

Intrusives seem to have been stopped by the Goodrich quartzite as in the Michigamme district. This means that at least part of the concentration of the ore took place before the intrusions. The folding which followed the intrusions undoubtedly fractured the iron formation to a very large extent. This is the reason for secondary enrichment here. Doubtless also shattering due to intrusion.

Order of events seems to be: (1) weathering of Negaunee formation when exposed; (2) covering by Goodrich conglomerate; (3) intrusions and shattering; (4) folding and shattering; (5) erosion and concentration.

General. Argument that ore concentration in the iron formations is proportional to area exposed takes no account of subsequent burial.

Specimens 47556-47558 presented by
R. C. Allen, State Geologist of Mich-
igan, November 1909.

47556

Slides:

17467

17468

17469

17470

(Allen's No. 138) Iron ore from
drift on third level of Dober Mine.
This material grades along the strike
in a distance of about 18 inches into
specimen 47557.

47557

Slides:

17471

17472

(Allen's No. 139). This specimen
is from the drift on third level of
Dober Mine, Iron River district, Mich.
Grades into specimen 47556 in a distance
of about 18 inches in one direction,
and into specimen 47558 in about the
same distance in the opposite direc-
tion.

47558

Slides:

17473

17474

17475

17476

(Allen's No. 140) Ferruginous black
slate from drift on third level of
Dober Mine, Iron River district, Mich.
This material forms the breast of the
drift. Work was stopped when it was
encountered on account of low iron
contents. This material grades in a
distance of about 18 inches into spec-
imen 47557, and in an additional 18
inches into specimen 47556.

47557 - 575 Steidtmann
rocks

Copper

76

47559

Slides

17494

17495

17496

Specimen showing oxidation of sideritic slate and apparently development of magnetite during this oxidation. From testpit near maximum magnetic line at Delphic exploration, sec. 24-42-33, Crystal Falls district, Mich. Collected by W. J. Mead, May 1910.

C. B. Lawton 17 July 1907



