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Penokee-Gogebic Region, Michigan: [specimens] 9331-9594. No. 37 August, 1885

Van Hise, Charles Richard, 1857-1918

[s.l.]: [s.n.], August, 1885

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 37.

August, 1885

Penokee - Gogebic Region.

Michigan.

C. R. Van Hise,

9331-9594.

Survey of the Pre-Cambrian Rocks of the N. W. States.

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 figure attached, showing the amount and inclination of the dip. Denote slaty or other very plainly bedded rocks by lines running in the direction of the strike, with figures and a dip arrow attached as before. In all cases where there is the least doubt about the true bedding directions, 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 line as 100 paces, and twenty of these spaces as 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.

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, for instance: 4025 | 250 N., 300 W., *Strike, N. 6° E., Dip, 50° E.* Then follow with as full a description of the ledge as possible.

3. The ruling of the left hand page is also arranged so that a smaller scale can be used. Each one of the black lines may represent a section line and the red lines quarter sections and "forties." The scale of the maps may thus be reduced, if desirable, to two inches to the mile (the ordinary town plat scale.)

4. Collect a specimen from each separate ledge of rock, or wherever there is a change of rock on any one ledge. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be sampled, the position and extent of the ledge being marked on the map, with a note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples, trimmed to a uniform size of $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2}$ 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 § 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. In all cases collect chips for slicing. All specimens are to have numbers painted on them, in white on a black background, in the field.

5. 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., etc.

6. Forward this note book, as soon as filled, as registered mail matter, to R. D. IRVING, U. S. Geologist, Madison, Wis.

- 1
9331. Matrix of Conglomerate 500 W. 960
 9332 S. of N $\frac{1}{4}$ post sec 14. North
 brow of hill. The conglomerate
 here bears large boulders,
 9333 being from one 16" in diameter
 From the above point there
 is a continuous western exposure
 to
 9334 Compact graywacke. 1270 S. 470 W.
 of N $\frac{1}{4}$ post sec 14. This rock is
 here often named as shown in
 9335 Graywacke with calcudonic seams.
 At this point the western ex-
 posure is an overhanging cliff
 50 feet high. The upper part
 of the ledge as seen from below
 seems to be the ordinary slate
 conglomerate of the region. From
 this point the ledge continues
 to 500 W. 16 25 S.

In ascending from the bottom
 of creek valley to 9331, a height
 of 100 feet is indicated by the
 barometer.

Sec 23 T. 47

R. 44

110
X 50

9338
9339
9340
9341
9342
9343 101.0

23

Slate Conglomerate 500 W. 1620
S of N. $\frac{1}{4}$ post 14.

9386 Siliceous Slate. Huge bare
northern cliff 500 W. 1780 S. of
N. $\frac{1}{4}$ post sec 14. Strike W 10°
S. Dip 45° S. This exposure
continues to and becomes

9387 Fine Conglomerate 500 W. 1925 S.
of the N. $\frac{1}{4}$ post sec 14.

The center of the western face of
a huge ledge of slate and slate con-
glomerate is found 500 S. 400 E.
of the N. W. corner sec. 23, 4 $\frac{1}{2}$, 44.
The ledge has a vertical bare
western face in places 100 feet high.
Its face was followed north 100
steps and south 100. At the north-
ern end the cliff is slate con-
glomerate. 90 steps south of
the base it becomes black
slate and 25 steps farther on
varies gradually into coarse
gray slate. This phase contin-
ues 25 steps farther south

where the slate conglomerate again appears and continued as far as followed. The pebbles of the conglomerate average larger at the southern than at the northern end of the exposure. 9888 represents the average size of the pebbles at the north end. At the south side the ledge bears pebbles averaging 2" in diameter, while many are four or five inches. The strike and dip of the conglomerate are difficult to make out with certainty. The slate cleaves in various directions. The strike and dip as determined by the faint transverse bands of the black slate along which there is no cleavage is strike $N 10^{\circ} S$. Dip $80^{\circ} S$. The strike and dip as averaged from the more prominent cleavage cracks, with which that of the coarse schist exactly corresponds is strike $N 10^{\circ} S$. Dip $30^{\circ} S$. The pebbles are no certain assistance in

determining dip. It seemed to me however that they too are in line corresponding to this determination. The specimens are numbered as taken from north to south along the face of the cliff.

- 9338 Conglomerate, showing the ordinary pebble. These make up the mass of the rock in most places.
- 9339 Shows a red pebble, the only one seen. A few white quartz pebbles also were found.
- 9340 Conglomerate, showing peculiar weathering cavities such as one place
- 9341 Black slate
- 9342 Coarse gray slate
- 9343 Fine Conglomerate, the finest pebbled that could be found.

Slate Conglomerate. Large western face 225° S. 60° E. of N. W. corner sec 23, 47, 44. Strike W 10° S. Dip 50° S.

Here the weathering, shows the flat sides of the pebbles in distinct rows corresponding to the above.

24 T. 47

R. 44

24

* 9344-5-6-7

* 9348

* 9849
30

* 9350

Monday, Aug 3, 1885.

Started 500 W. of the N. E. corner, Sec 24, T47, R44 and ran south to the south line of the section; thence east to the S. E. corner; thence west 400; thence south 250; thence west 100; thence south to south line of section²⁵; thence west to 500 W. of S²⁵/₄ post sec 25; thence north 800; thence west to west line of section; thence north to N¹/₄ post. Rain thickened and soon began; so we went to camp.

- 9344 Conglomerate, matrix of. 400 W. 140 S. of the N. E. corner of Sec 24. The conglomerate here is exceedingly tough.
- 9345 Pebbles in Conglomerate, taken in contact with 9344.
- 9346 Crystalline mixture of quartz and Epidote from skin several feet wide in above.
- 9347 Fragments of pebbles from same.

Conglomerate 500 W. 280 S. of N.E. 24.
 Conglomerate. Large northern exposure
 50 steps east and west 500 W. 300 S.
 of the N.E. corner sec 24
 This exposure is continuous to the
 south side of the hill 500 W. 523 S.

9348 Slate Conglomerate. Southern
 exposure 500 W. 590 S. of N.E. 24.

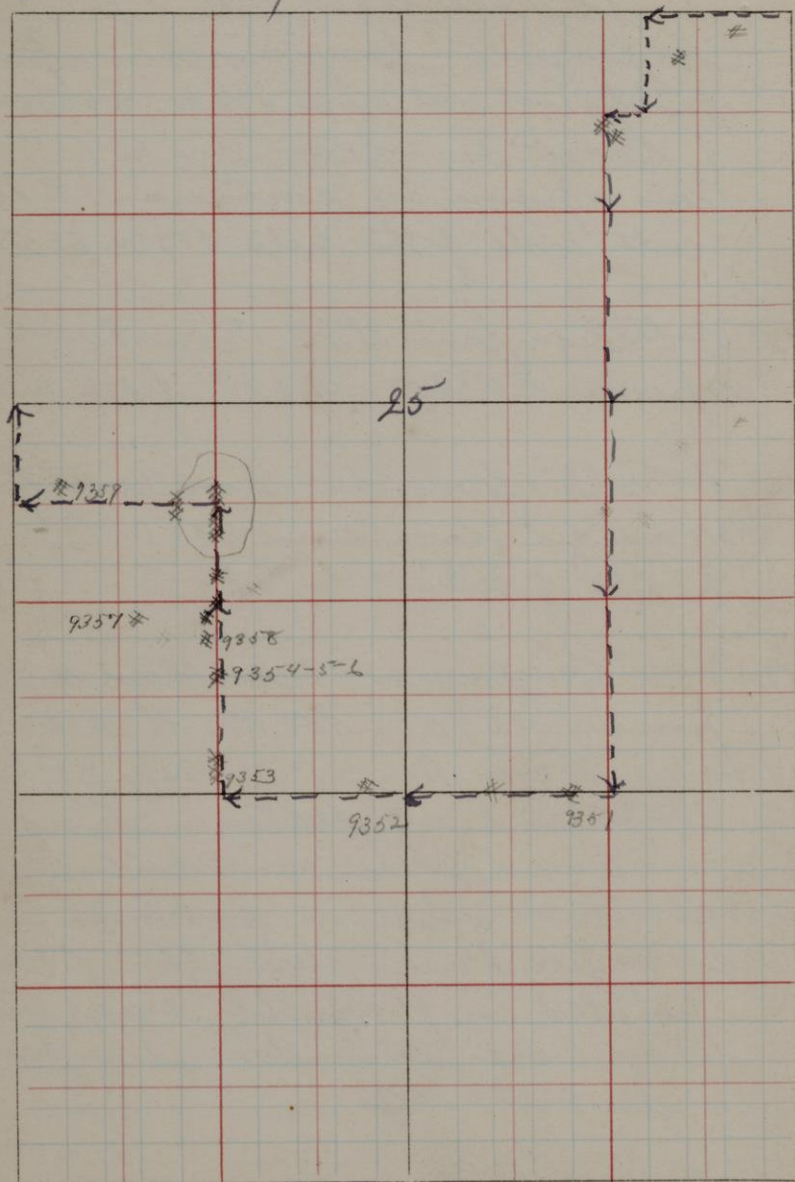
Slate Conglomerate. Low outcrop
 at end of a beaver dam 500 W.
 975 S. of N.E. 24.

9349 Slate Conglomerate. Northern ex-
 posure. 1575 S. 500 W. of N.E.
 24. Strike W. 100 S. Dip 800 S.
 Strike and dip determinations
 are based upon a schistose
 structure and a distinct
 correspondence with this of the
 pebbles in parallel lines with
 their least diameters at right
 angles to the dip.

9350 Slate Conglomerate. 20 N. 475 W.

Sec 25 T. 47

R. 44



of the S. E. corner sec 24.

Large Boulder of Banded Ferruginous Schist, 10 feet in diameter.
125 W. 20 S. of the N. E. corner sec 25.

Typical Slaty Conglomerate at following points

140 W. 50 S. of the N. E. corner sec 25;
800 W. 120 S. " " " " " "
470 W. 80 S. " " " " " "
500 W. 270 S. " " " " " "

9351 Hornblende Schist. 400 E. of the
S $\frac{1}{4}$ post sec 25. East and west
approx 100 steps long.
Same 200 E. of S $\frac{1}{4}$ post.

9352 Coarse Hornblende Schist 120 W.
10 N. of S $\frac{1}{4}$ post sec 25.
Same 470 W. of S $\frac{1}{4}$ post.

9353 Coarse Massive Hornblende Rock.
500 W. 80 N. of S $\frac{1}{4}$ post sec 25 -
Same 500 W 100 N.

9354 Magnetic Schist. 500 W. 300 N.

9355 of the $S\frac{1}{4}$ part sec 20. The exposure extends 30 steps east and west and is ten to fifteen feet in height. In its immediate vicinity there are strong magnetic attractions

9357 Slate Conglomerate, Matrix of, 450 W. 700 N. of $S\frac{1}{4}$ part sec 20. A northern exposure 50 steps long east and west.

9358 Slate Conglomerate 520 W. 400 N. of the $S\frac{1}{4}$ part sec 20

Same 520 W. 400 N.

Same 500 W. 500 N.

The pebbles as heretofore described in this last exposure give a dip 40° S.

Same 500 W. 560 N.

" 500 W. 670 N. Latter continues to 500 W. 800 N. at which point we are upon a huge bluff of the conglomerate which can be seen to extend several

hundred paces north and 100 W.
 In going west 100 to the fork of
 the bluff a descent of 100 feet
 is made

9359 Greenstone. 800 N. 900 W. of 5/4
 post sec 23. 47, 44.

Tuesday, Aug 4, 1885.
 Rained all the forenoon.
 Starting at the west $\frac{1}{4}$ post
 Sec 13, T47, R44 N on to the
 N. W. corner; thence east 875;
 thence south 500; thence east
 500 and back; thence south
 1325 to 150 N 175 E of the
 S $\frac{1}{4}$ post; thence west to 700
 west of the $\frac{1}{4}$ line; thence
 north to 500 north of the south
 line of the section; thence
 east to 325 west of the N E
 South $\frac{1}{4}$ line; thence south
 to section line and east to
 the south $\frac{1}{4}$ post to verify the
 work; thence west 825; thence
 north 1000 to trail; thence to
 camp.

9360 Greenstone, Northern Fzop
 North side of range 140 E
 of the N. W. corner Sec 13.
 Running East we continued
 upon top of the range to
 825 E when we are again at

11

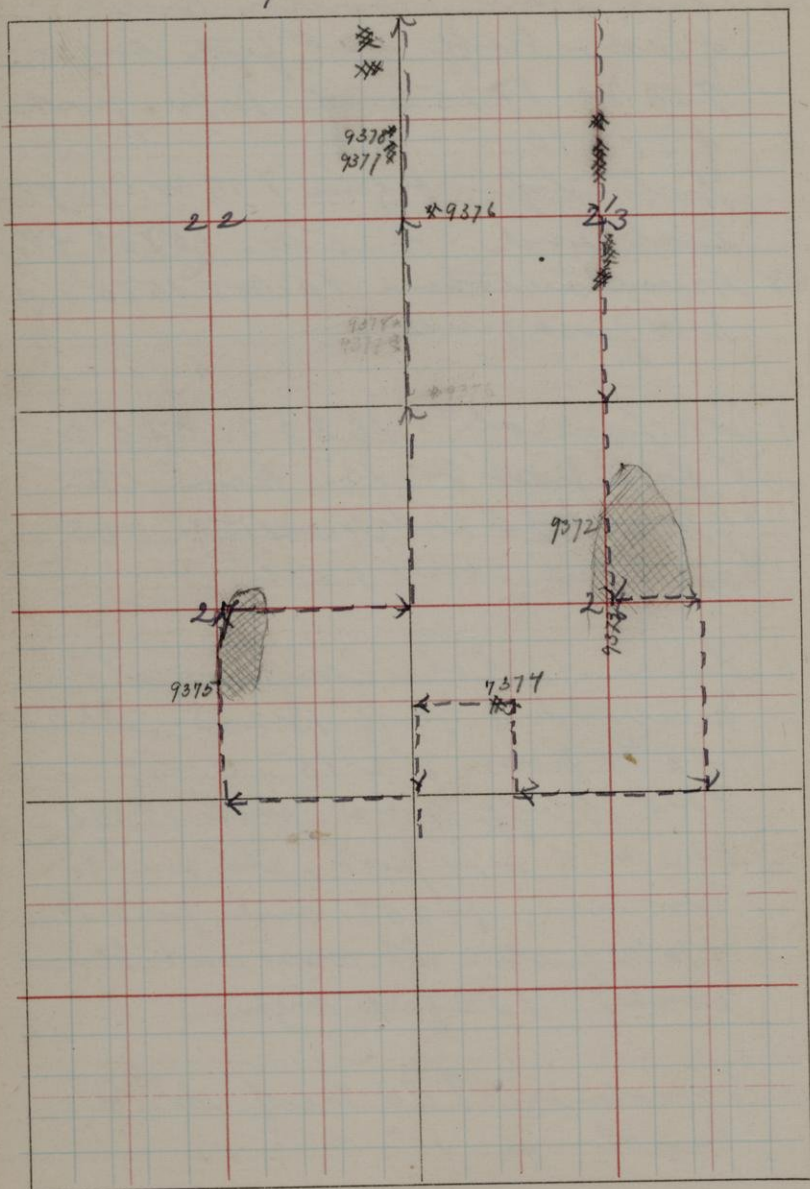
the northern brow with ledge
N 7 10 E this bluff terminates
with eastern exposure.

- 9361 Greywacke 520 S. 875 E. of the
N $\frac{1}{4}$ post sec 15. The specimen
is taken from the north side
of the ridge. This was followed
to 500 S. 125 W with exposure
at intervals.
- 9362 Southern brow of same hill
640 S. 125 W. of the N. $\frac{1}{4}$ post
of sec 15.
- 9363 Greywacke. Foot of same bluff
775 S. 125 W. of N $\frac{1}{4}$ post sec
15. There is a drop of fifty
feet in going from 750 S. to 775 S.
- 9364 Brunstone. Northern exposure
1200 S. 125 W. of N $\frac{1}{4}$ post sec 15.
- 9365 Slate Conglomerate. A large south
ern exposure 1570 S. 250 W.
of N $\frac{1}{4}$ post sec 15.
- 9366 Finer grained phase of same.

- 9367 Greenstone. South side
of huge bluff 225 feet high.
700 W. 1775 S. of N $\frac{1}{4}$ post
of sec 10.
North slope begins 700 W. 1875 S.
East end 425 W. 1875 S. of $\frac{1}{4}$ post.
- 9368 Greenstone tober 400 W. 1875 S. of
N $\frac{1}{4}$ post sec 10.
- 9369 Conglomerate. 1685 S. 325 W.
of N $\frac{1}{4}$ post sec 10. From this
point the ledge extends 605
out then turns east.
- 9370 Slate of Slate Conglomerate
West end of bluff 1825 S. 325 W.
of S $\frac{1}{4}$ post sec 10.
This bluff was met 1700 S
125 W. of N $\frac{1}{4}$ post, its south
base being 1825 S. and foot 1900 S.
of N $\frac{1}{4}$ post. It was not broad
east. 150 feet high.
- 9371 Greenstone. 950 E. of W $\frac{1}{4}$
post sec 10.

T. 47

R. 44



Wednesday, Aug 5, 1885
 Started at the $N\frac{1}{4}$ post sec 23,
 T 47, R 44, and ran south to
 the center of sec 26; thence
 east 500; thence south to
 the south line of 26; thence
 west to 500 west of the $S\frac{1}{4}$ post;
 thence north 500; thence
 west 500 to west line of section;
 thence south to the S. W. corner
 of sec 26; thence west to
 $S\frac{1}{4}$ post sec 27; thence north
 1000; thence east to $E\frac{1}{4}$ post;
 thence north to the N. E.
 corner sec 22.

Typical Conglomerate from
 5005 to 5755 of $N\frac{1}{4}$ post sec
 23.

Typical Conglomerate from
 6205 to 8508 of $N\frac{1}{4}$ post 23.

Conglomerate. Large western
 face from 11005 50 E to 12255
 202 of $S\frac{1}{4}$ sec 23

Conglomerate from 1250 S. to
1300 S. of N $\frac{1}{4}$ post sec 23.

In section 26, 47, 44 is a
high bluff of greenstone. Its north-
ern end is 325 S 100 E of the N $\frac{1}{4}$
post. The $\frac{1}{4}$ line reaches the
foot of the bluff 400 S. 470 S. it
is well up upon the side of
the bluff. As we ran the top of
the hill was reached at 630 S.
07 E where it is 300 feet high.
Running upon the top of the bluff to
1030 S. 100 E. the hill becomes
400 feet high. Running east
on the east and west $\frac{1}{4}$ line
the east foot of the bluff is
reached at 1000 S 00 E. of the
N $\frac{1}{4}$ post.

9372 Greenstone 480 S. 70 E. of N $\frac{1}{4}$ post
sec 26.

9373 Greenstone 1000 S. 100 E. of N $\frac{1}{4}$ post
sec 26.

9374 Greenstone 560 W. 500 N. of S $\frac{1}{4}$
post sec 26

9376 Brunstone. Top high bluff
800 N. of the $S\frac{1}{4}$ post sec 27.
The western face of this hill
extends to 1000 N. of the $\frac{1}{4}$ post
it being about 80 feet high.
Its north face extends from
the latter point to 1890 N. 140 E.
of the $S\frac{1}{4}$ post. East face
bored 1000 N. 275° E. of $S\frac{1}{4}$ post.

9376 Fine grained Brunstone. 125° E.
30 N. of the N $\frac{1}{4}$ post sec 23

9377 slate, containing a few pebbles
Western face 30 feet high
830 N. 25 W. of the $S\frac{1}{4}$ post
sec 22. Extends to 400 N. 30 W.
Strike N 100° W. Dip E 32.

9378 slate. Exposed in bed of creek
425 N. 15 W. of $S\frac{1}{4}$ post sec 22.

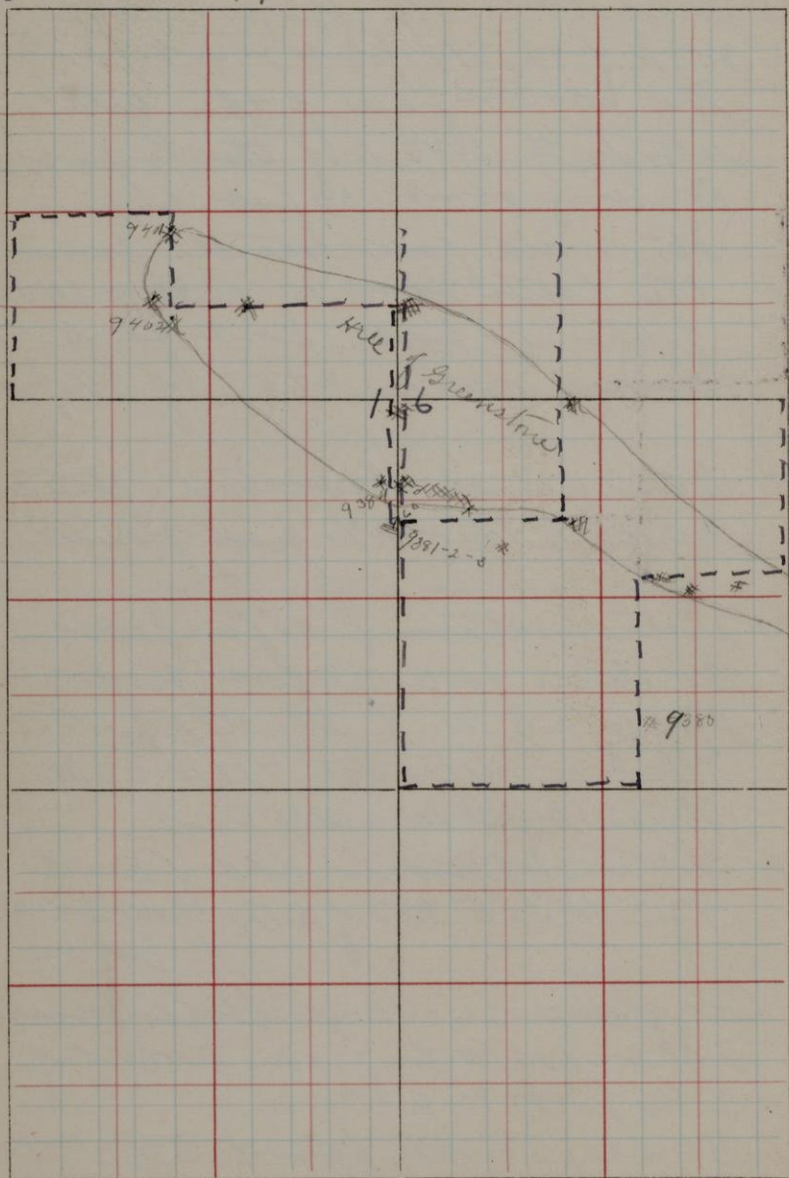
Conglomerate. High bluff from
700 N. 100 W. to 700 N. 200 W. of
 $S\frac{1}{4}$ post sec 22.

Same, South face of 800 N. 100 W.
and inclines to 830 N. 175 W.

Sec 16

T. 47

R. 44



Thursday Aug 6, 1885.
 Starting at the $2\frac{1}{4}$ post of Sec 16,
 T47, R44, meron 450 S; thence
 400 West; thence south to section
 line; thence west to $3\frac{1}{4}$ post
 thence north to trail 1400 N.
 of $5\frac{1}{4}$ post. However as upon
 this last run we encountered
 strong magnetic attraction with
 cloudy sky and rain we were
 obliged to stop work for the
 forenoon.

9379 Greenstone. South brow of high
 range 520 S. 102. of the W $\frac{1}{4}$
 post Sec 15, 47, 44.

Greenstone, Lake Level 470 S.

160 W. of $2\frac{1}{4}$ post Sec 16.

Same 470 S. 260 W

Same 450 S. 260 W

Same 450 S. 850 W.

All of the above are upon
 the south slope of the same
 hill.

17

9380 Greenstone. 830 S. 870 W. of
2 1/4 post sec 16.

At 800 S. 400 W of 2 1/4 post sec
16, there are heavy local
attractions which become in-
perceptible 50 steps north
and south of this point. Sun
obscured and the variation
could not be measured.

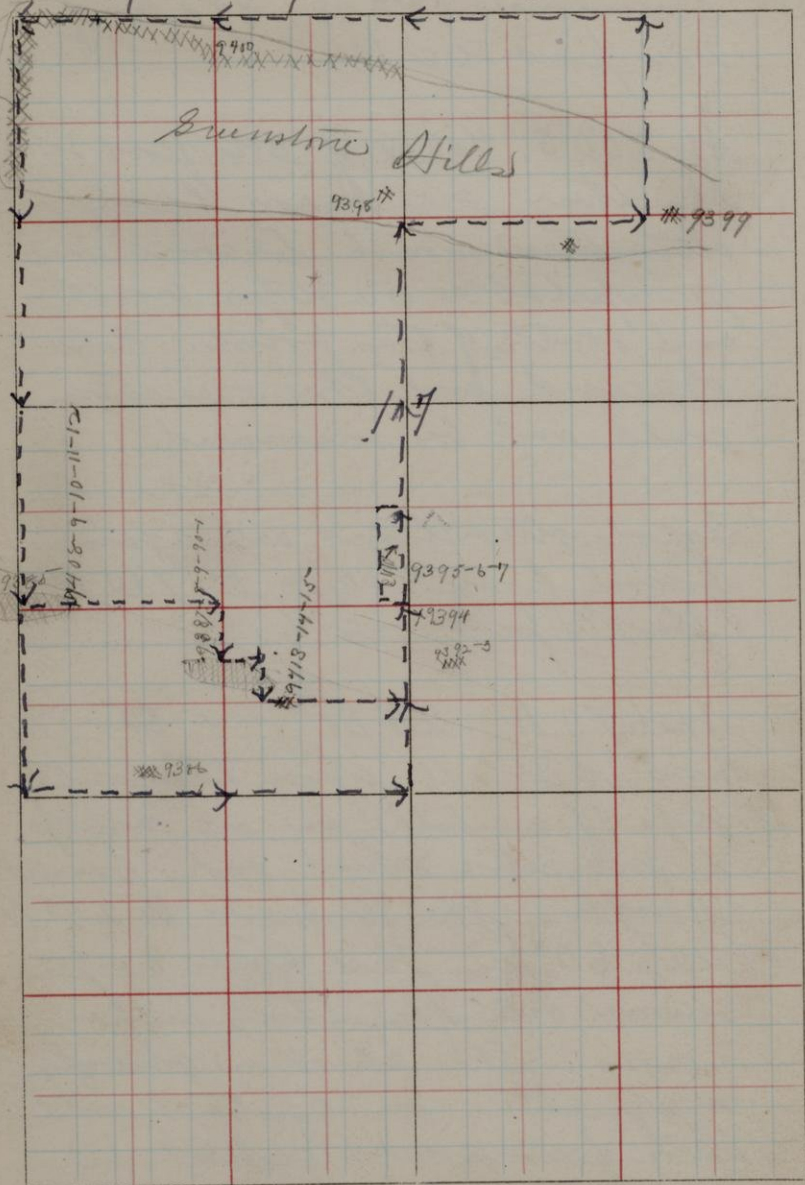
Local attractions are again
found from 400 N to 700 N of
the 5 1/4 post sec 16.

At 670 N 20 W. of the 5 1/4
post of sec 16 upon the south
slope of a hill is an outcrop
of Magnetic schist and banded
Gasper. The strike is W 25° N
dip 60° N. The pure gasper
seams are often two inches
across. The schist is strongly
magnetic. In contact with
this ferruginous schist is
massive fine grained

Sec 17

T. 47

R. 44



greenstone.

9381 Banded Jaspery Schist

9382 Magnetic Slates or Sanderw.

9383 Greenstone in contact with the above.

9384 Greenstone. South Brow of High East and West hill above 9381-2
800 ft of $5\frac{1}{4}$ foot sec 16
Sound 800 ft. 50 ft.

In the afternoon starting at the NW $\frac{1}{4}$ post of sec 17, 47.44,
we ran south 500; thence
Iron 500 East; thence 150 South;
thence 100 E; thence 100 South;
thence 400 E to 200 ft of the $5\frac{1}{4}$
post, in the mean time clay
running from the point of separation
section south to the S. W.

corner sec 17, thence east to
the $5\frac{1}{4}$ post; thence 200 ft to
the place of meeting; thence
we ran 1500 ft. of the $5\frac{1}{4}$ post;
thence 600 E; thence north
to section line; thence west

to the N. W. corner of Sec 17;
thence south to the place of
beginning at the $W\frac{1}{4}$ post.

9385 Limestone. North face of hill
50 feet high 400 S of $W\frac{1}{4}$ post
Sec 17. The ledge runs east
and west from this point as
far as can be seen. The middle
of the east end of the hill is
5000 100 E of the $W\frac{1}{4}$ post.

9386 Greenstone. Large northern face
300 E 70 N. of the S. W. corner
Sec 17.

At 450 E. 600 S. of the $W\frac{1}{4}$
post of Sec 17. there is a ^{thin} ~~large~~
northern exposure of limestone,
feruginous schist, ^{chlorite} quartzite and
siliceous slate, they being in-
terbedded in the order men-
tioned beginning with the
limestone at the top of the
face and ending with the
slate at the base. From

the point mentioned the
ledge stretches west 50 steps and
east 100 steps from which point
is bears south of east to

9387 Limestone 7263.6255' N 1/4 sec

9388 Chloritic Schist

9389 Ferruginous Schist & Quartzite

9390 Quartzite

9391 Siliceous Slate.

9392 Quartzite, two phases of, 850 N.

9393 70 E. of the 8 1/4 sec & sec 17.

From this point the ledge ex-
tends 50 E.

9394 Veined bituminous Quartzite. Just
pit 476 N. 25 E. of 8 1/4 sec.

From 580 N. 80 W. to 610 N. 80 W.
there is a test trench exposing
a deposit of lean magnetic ore,
banded Jaspery ore and quartz-
ite. This exposure is upon
the north side of a hill and
in its vicinity the middle is
controlled entirely by the

magnetite present. The strike is
N 20° W. Dip 53° W.

9393 Magnetitic slate.

9394 Jaspery schist

9397 Banded Ferruginous Quartzite

At 1300 ft of 8 1/4 post sec 17,
there is a magnetic attraction

At 1340 ft. Needle points N 48° W.

" 1430 ft " " 90 W.

" 1510 ft " " 5 W.

9398 Greenstone. South side of large
hill 1550 ft. 50 W. of 8 1/4 post
sec 17.

Same North side of another
large hill 1440 ft. 400 E of
the 8 1/4 post sec 17.

9399 Greenstone, Summit of hill
570 E. 1500 ft of 8 1/4 post sec 17.
North face 600 E. 1370 ft.

Running ^{nearly} east and west from
100 ± 100 paces south of the
north line of sec 17. From the
N. 1/4 post to the N. W.

corner of sec 17 is a high ridge of greenstone. The face of the ridge reaches the line at 800 W of the $\frac{1}{4}$ post and near the corner the line is upon the summit. The west line of the section from the N.W. corner to 400 S of the corner is either over greenstone or just west of the west face of the bluff. About the bluff at various points there are strong magnetic attractions.

9400

Greenstone 300 W. 75° S of the $\frac{1}{4}$ post sec 17.

200 W. of $\frac{1}{4}$ post mag. N. 35° W.

400 W. " " " " " " 30° W.

500 W. " " " " " " 30° W.

700 W. " " " " " " mag. N. 0.

At N.W. corner " " 20° W.

400 S. of N.W. corner M. A. 20° E.

450 S. " " " " " " 30° E.

Camp moved to the S.E. $\frac{1}{4}$, N.E. $\frac{1}{4}$ Sec. 18, T 47 R 44. Camp, XX

Friday, Aug. 7, 1885.
 Starting at the $W\frac{1}{4}$ post sec 16,
 we ran north 800; then east
 400; then south 250; then
 east 600 to N. & S. $\frac{1}{4}$ line;
 then south 550 to 800 of the
 center of the section verifying
 previous locations there made
 by needle; then east 400;
 then north to trail and
 Camp. Sec 16, 47, 44.

The Limestone ridge in sections
 17 & 18 was examined in detail.

9401 Greenstone, High northern
 exposure, 400 E. 470 N. of the
 $W\frac{1}{4}$ post sec 16.

Greenstone, south side of same
 hill which runs E. & N. 1840 E.
 270 N. of the $W\frac{1}{4}$ post sec 16.

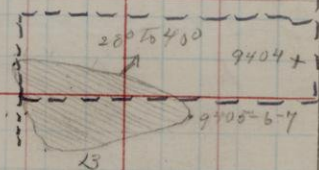
9402 Greenstone, Foot of above hill
 400 E. 280 N. of $W\frac{1}{4}$ post 16

Greenstone 600 E. 250 N. of $W\frac{1}{4}$ post.
 From this point we now leave

Sec 18 T. 47

R. 44

18



upon the top of the greenstone
range to 10002 200 W. of the
W 1/4 post where there are ledges.
Ledges of same 10002. 300 S. of W 1/4 post
Ledges of same 10002. 200 S. " " " "

9403 Greenstone 655 W of S 1/4 post sec
16. Test pit

Ledges continuous from 290 S. 10002
of W 1/4 post to 290 S. 1140 E.

Same 870 S. 1200 E.

" 300 S. 1400 E.

" 200 S. 1400 E

" 300 S. 1400 E. Here we

are at the northern base of the
range.

9404 Talrose Limestone. Test pit
400 S. 40 W. of the S 1/4 post sec 18

9405 Massive Limestone. East end
of large east and west bluff.

550 S. 330 W. of the S 1/4 post
Sec 18. Strike W 130 W. Dip 28 N

9406 Siliceous Limestone from same
locality

9407 Same, showing characteristic
weathering

Running west from the above point our course is directly along the top of the high limestone bluff, being at 5505 500 W. 100 feet high. The west end of the bluff thus found is 5505, 730 W. of the $2\frac{1}{4}$ post sec 18. The N. W. corner is 775 W. 420 S. of the $2\frac{1}{4}$ post. The S. W. corner is 6505, 700 W. of the $2\frac{1}{4}$ post. Slip at W. end of hill 40° N.

At the east end of the hill from which 9885 is taken 5005, 100 E. of the W $\frac{1}{4}$ post sec 17, this being the eastern terminus of the hill, below the limestone which is here massive, is found in the order mentioned from below beginning at the top of the ledge, limestone, chloritic schist, ferruginous schist, quartzite, and siliceous slate, and all within a vertical distance of ten feet. The latter varieties of rock first appear in this

Limestone ledge 4755, 752
of the W 1/4 post sec 17.

9408 Limestone

9409 Chloritic Schist

9410 Ferruginous Schist

9411 Marble

9412 Siliceous slate

All of the above layers are too
massive to give strike and dip
except the last and this having
slaty cleavage is very irregular in
dip, it however being averaged at
85° N.

9413 Flint and Chert Breccia. Low

9414 northern exposure 508 ft along 6502.

9415 7503. of the W 1/4 post sec 17.

Saturday, Aug 8. Rain all
day.

T. 47

R. 45

9429-2, 7000
9429-30-1-2-3

9429-2
9429-3
9429-4-5

9429-6
9429-7
9429-8

Micro. Check
7000 Eng.

M.S.

9427-8

9426

Sunday, Aug 9, 1885.

We moved camp to the N.E. corner
Sec 9, upon Sunday Lake. Trail
was thus followed from the east
side of sec 18, 47, 44 to the above
locality. Upon our way we left
the trail at the N $\frac{1}{4}$ part of
Sec 14 and ran 7258; thence
west to west line; thence north
to trail. In the afternoon we
started at the N $\frac{1}{4}$ part sec 10
and ran east 500; thence
south to the south line of the
section; thence east to 300 East
of the S $\frac{1}{4}$ part; thence west 100;
thence north 700; thence to
trail and camp. Camp XXI

9416 Micca Schist 600 W. 175° S of the
E $\frac{1}{4}$ part of sec 13, 47, ~~44~~, 45.

9417 Micca Schist 575 W. 101 N. of the
E $\frac{1}{4}$ part of sec 13.

This large exposure extends from
the position 9416 to that of 9417
N. + S. and from 575 W. to 675 W.
The schist is quite massive; yet
it cleaves in a southern direction.

Sec 13 T. 47

R. 43

13

1941/4
Mica
Schist
1941/6

An exposure of micaceous
 flint conglomerate, quartzite,
 and flint or chert extends from
 220 S. 50 E to 220 S. 220 W.
 of the N $\frac{1}{4}$ part of sec 14, 47, 48.
 and from this northern face
 355. The following specimens
 were taken from different parts
 of the exposure

9418 Micaceous Chert Conglomerate.

9419 220 S. 75 W.

9420 Flint Conglomerate. 220 S. 220 W.

9421 Quartzite. 220 S. 200 W.

9422 220 S.

9423 South side of exposure. 260 S. 75 W.

9424

9425

9426 Micaceous Schist. 720 South of
 N $\frac{1}{4}$ part sec 14

9427 Micaceous Schist 650 S. 240 W. of the
 N $\frac{1}{4}$ part sec 14.

9428 Micaceous Schist 600 S. 340 W. of $\frac{1}{4}$ part.
 The exposure from which 9427-8 are
 taken extends 270 W to 370 W

and from 600 S to 700 S. of the
N. W. part of sec 14.

9429 Quartzite. 100 E 110 S. of the N. W.
corner sec 14.

9430 Flinty Quartzite 100 E. 100 S.
of the N. W. corner sec 14

9431 Flint 100 E. 90 S. of the N. W.
corner sec 14.

9429-30-31 are from the same
ledge.

9432 Sandstone. 80 E. 70 S. of the

9433 N. W. corner sec 14. This is
the north side of the same 4-
pole from which 9429-30-31
are taken

9434 Chert. Test pit 60 E. 77 S. of the
N. W. corner sec 14.

9435 Siliceous slate. Small exposure
9436 60 S. 60 E. of the N. W. corner
sec 14

T. 47

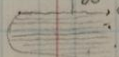
R. 45-

9437

XXXXXXXXXXXX
bushes

By 9428
90 9439
90 9439
90 9439

65



9440
9441
9442
9443

10

By 9436

9436

9454

9452

2.8. + 7.2

9444-6-6-7-89
50-1

15-

9437 Greenstone. Western end of bluff
100 S. to 735. of the W $\frac{1}{4}$ post
Sec 10, 47. 46. This exposure
is continuous to 500 E. of the
 $\frac{1}{4}$ post.

9438 Greenstone. Test pit 500 E 160 S.
of the W $\frac{1}{4}$ post sec 10.

9439 Banded Jasper Cr. 510 E, 200 S of
the W $\frac{1}{4}$ post sec 10

Levan Cr 610 E, 220 S. of the
W $\frac{1}{4}$ post sec 10. Test pit.

Rich Cr. Test pit. 500 E. 270
S. of the W $\frac{1}{4}$ post sec 10.

A large bluff of slaty quartzite
and quartzite extends in a
chick east and west direction
with a straight bare northern
face for 100 steps from 550 S.
375 E. to 550 S. 150 E. of the
W $\frac{1}{4}$ post of Sec 10. The northern
face is a plane surface a
hundred paces long with a

slope of 65° and being in places
20' to 30' high.

9440 Quartzite 550S. 375E.

9441 Quartzite 600S. 375E.

9442 slate Quartzite 640S. 400E.

The ledge here beautifully shows
large ripple marks and the
bedding is sufficiently plain
to give strike at an angle 75° N.

9443 slate. 670S. 400E. This spec-
imen is on the southern foot
of the exposure.

9444 Quartzite.

9445 Banded Flint

9446 Flint or Chert

9447 Chert Conglomerate

9448 Large Chert pebble

9449 Specimen showing gradation
of conglomerate into sandstone

9450 Sandstone

9451 Sandstone. Exposure and test
for 300 E. of the $S\frac{1}{4}$ post
Sec. 10 The specimens are taken
in the order given from south
to north across the strike

Their relation is explained in notes of the previous year in reference to this locality.

A Large exposure of slate and slaty quartzite with quartzite extends from 200 N. 200 E. of the $5\frac{1}{4}$ post sec 10 to 400 N. 200 E. It extends east and west in fully as great or greater but was not traced out.

9452 Slaty quartzite. Top of hill.

9453 200 N. 200 E. of $5\frac{1}{4}$ post. Small ledge. Strike N 20° W. Dip 33° N. Large ledge near by same strike 24° W. Dip 58° N.

9454 Quartzite 370 N. 200 E.

9455 Limestone Jasper ore. Feet fine 515° N. 125° E. of the $5\frac{1}{4}$ post sec 10.

Greenstone. High southern exposure. 725° N. 125° E. of the $5\frac{1}{4}$ post sec 10.

T. 47

R. 45

M.S. 9456

16

M.S. 9457

M.S.

M.S. 9458

Monday, Aug 10, 1885.
 Starting at the N.E. corner sec 16,
 T 47, R 45, we ran west 5600
 W of the N $\frac{1}{4}$ post; thence east
 to $\frac{1}{4}$ post; thence south 500;
 thence east 200; thence south
 1000; thence west 200; thence
 south to S $\frac{1}{4}$ post; thence
 west to the S $\frac{1}{4}$ post sec 17;
 thence north 1600 to rail road
 and upon it to Black River.
 Specimens were also collected
 from localities located the
 previous summer.

9406 Micaceous Schist, 1980 N. 1630 W
 of the S. E. corner sec 16. Small
 Eastern exposure. Strike W. 13° N.
 Dip 56° S.

9407 Micaceous Schist, 1500 S. 170 E,
 of the N. $\frac{1}{4}$ post sec 16. Thin
 northern exposure runs west
 to 1300 S. 70 E and thence to
 1320 S. and as far west from
 this point as the eye can

T. 47

R. 43⁻

7

* m, s,

m, s, x 9469

reach, or least 100 steps.

Mica Schist. Like last.

1630 S. 25 E. of the N $\frac{1}{4}$ post
Sec 16.

9458 Hornblende Schist. 1700 S of the
N $\frac{1}{4}$ post sec 16.

Same 1800 South

Same 1900 South.

9459 Marble Mica Schist. Just
pic 170 N. 40 W. of the
8 $\frac{1}{4}$ post of sec 17, T47, R45

Same. Northern exposure
400 N. of 8 $\frac{1}{4}$ post sec 17.

9460 Exposed in the bed and along

9461 the west bank of Black River

9462 555 S. 180 W. of the N $\frac{1}{4}$ post

9463 of sec 13, ^{T47 R46} and from this running
150 N is siliceous slate and
quartzite, typical "formation
III". Taken as a whole its
strike or near as can be

T. 47

R. 46

$\times 9485$
 $\times 9495$
 $2 \times 9495-1$

12

$\times 9491-2-3-4$
 $\times 9489-90$
 $\times 9488-88a$

7.2×9487
 $\times 9486$
 $B.7.2 \times 9481-2-3-4$

$2v. 0.0 \times 9479$
 $\times 9480-122$
 0×9483
 0.2×9484
 $3.0 \times 9485-1-7$
 $\times 9486-9$
 2×9487
 $\times 9488$
 $9489-13$

$2v. 0.0 \times 9477$

$\uparrow 75-$
 $\times 9460-1-2-3$

$\times 9461-5-6-7$
 $\times 9470 \times 9478$
 $\times 9472-8-9-5-6-7$
 $\times 9471$
 $\times 9479-40$

13

determined in E & W., its dip from 70° to 75° N. It has been much folded and the curves are compound showing alike in strike and dip. The curves are at times gentle and again are so abrupt as to become almost right angles. Frequently the strain has broken the layers, and here instead of a curve of a fold the layers make sharp pointed angles. A half dozen contractions are often seen in the space of ten feet, while again a single simple curve may occupy that space. The specimens are taken from south to north across the face of the ledge.

9464 Greenstone. 480 S. of the N. E. corner sec 13, T 47 R 46. Exposure upon south bank of creek.

9465 Lean Banded Jaspery Ore. French in south bank of creek 480 S. of the N. E. corner sec 13

- 9466 Banded Marzylite Cr. from same trench.
- 9467 Lelon Cr from same place.
Greenstone like 9464 is here also found in contact with 9465-6-7
- 9468 Outcrops upon south bank of creek 480 S. 80 W. of the N. E. corner sec 13.
This is mingled with materials like 9465-6-7, the latter being the prevailing kinds of rocks.
- 9469 Black Banded Ferruginous Slate.
470 S 90 W of the N. E. corner sec 13.
Strike 24 W. dip 60° N. This material continues upon the north side of the creek where it is found at 490 S. 180 W. of the N. E. corner Sec. 13.
- 9470 Ferruginous Marzylite Schist.
540 S. 160 W. of the N. E. corner of sec 13. South bank of creek
Mingled with it is a small quantity of
- 9471 Coarse Jasper Cr.
This is found continuing at 620 S

200 W. of the N. E. corner sec 13,

- 9472 600 S, 180 W. of the N. E. corner sec 13.
 9473 These specimens are taken to
 9474 show the different phases and
 9475 mixtures which in this exposure
 9476 are found of slaty granite and
 9477 lean and rich ore. It seems
 in this case that the iron
 has been a secondary replacing
 material, the replacement
 first taking place along the
 seams in the plane of sedimentation,
 and after leaving the
 more compact portions of the
 rock intact. In some cases
 upon the other hand the process
 has continued until rich ore
 is formed the material then
 showing little or no trace of the
 structure of the original sandstone
 or granite.

Just pit containing lean
 Slaty Ore 510 S. of the N. E.
 corner sec 13.

9478 Leron Flinty Ore. Test pit
555 S. of the N. E. corner sec 13.

9479 Leon Banded Slaty Ore. Test pit
9480 675 S. 180 W. of the N. E. corner
Sec 13, T 47, R 46.

Camp moved to the E $\frac{1}{2}$ of the
N. W $\frac{1}{4}$ sec 13, T 47, R 46 upon
Black River. Camp XXII

Tuesday, Aug 11, 1885.

The day was spent in visiting localities seen last summer the object being to get as complete a cross section of the Iron Range as possible open and in the vicinity of Black River, this being the most favorable point to obtain such a section between the Montreal River and Soudan Lake.

From 250 ft. of the S $\frac{1}{4}$ part of Sec 12, T.47 R.46. to 875 ft. 102, there is in the bed of Black River a continuous rock exposure. Sunday Lake Outlet empties into Black River at the foot of the above mentioned point. The structure, strike, dip &c are spoken of in my 1884 note books.

- 9481 Banded Ferruginous quartzite.
 9482 The specimens are taken within
 9483 a few feet of each other from
 9484 south to north across the strike
 of the ledge, 9481 being 250 ft.
 9485 Banded Jaspery Ferruginous

Schist. 295 N. 20 E.

9486 Coarse Jaspery Lean Ore, 825 N.
20 E.

9487 Ferruginous Quartzite. 875 N. 10 E.

At Four Fork Falls there is in
the bed of the river another exposure
of considerable size.

9488 Quartzite Flint } 635 N 90 W. (West Bank)

9488a Black Flint

9489 Flinty Quartzite 660 N 15 W. East Bank

9490 Cherty Limestone 675 N. 15 W.

9491 Cherty Limestone. Four Fork Falls.
685 N. 15 W.

9492 Black Hornstone 685 N. 15 W.

9493 Black Banded slate 698 N. to 700 N.
15 W.

9494 Porphyroferous Black Flint. From
700 N 15 W. to 710 N. 15 W.

9495 Red Quartzite } The two alternate

9496 (White Quartzite) from 1275 N to 1310 N.
of the S $\frac{1}{4}$ part sec 12.

9497 Quartzite 1325 N. 20 E. of the
S $\frac{1}{4}$ part sec 12. This quartzite

continue 3 steps north; then,
after a break of four feet,

9498 Buena Vista, Northern Dip. appeared
1332 ft. 20 E. of the S. E. corner sec 12,

9499 Banded Jasper Ore and Marzite
Test pit 1435. 40 E. of the N. W.
corner sec 13, T 47, R 46.

9500 Jasper Marzite } Test pit 1605.
9501 Red Marzite } 23 E. of the N. W.
9502 Lean Ore } corner sec 13,

Test pit containing same.
2005. 15 E. of the N. W. corner sec 13.

9503 Peculiar Slaty Ore. Test pit 2235.
75 E. of the N. W. corner sec 13,

9504 Homogeneous Slaty Marzite. 270 S.
100 E. of the N. W. corner sec 13,

9505 Peculiar Chert or Hydro-micaceous
9506 Rock. Test pit 3205. 110 E. of
9507 the N. W. corner sec 13,

Levan Ore. Test pit 820 S. 90 E.
of the N. W. corner sec 13.

Material like 9008-6-7. North
end of test trench 830 S. 85 E.
of the N. W. corner sec 13.

Levan Ore, Jasper, Rich Ore in
small seams. Test trench from
830 S. 85 E. 400 S. 100 E.

9008 Jaspery Ore, from trench.

9009 Flinty Quartzite. This appeared only
at the south end of the trench.

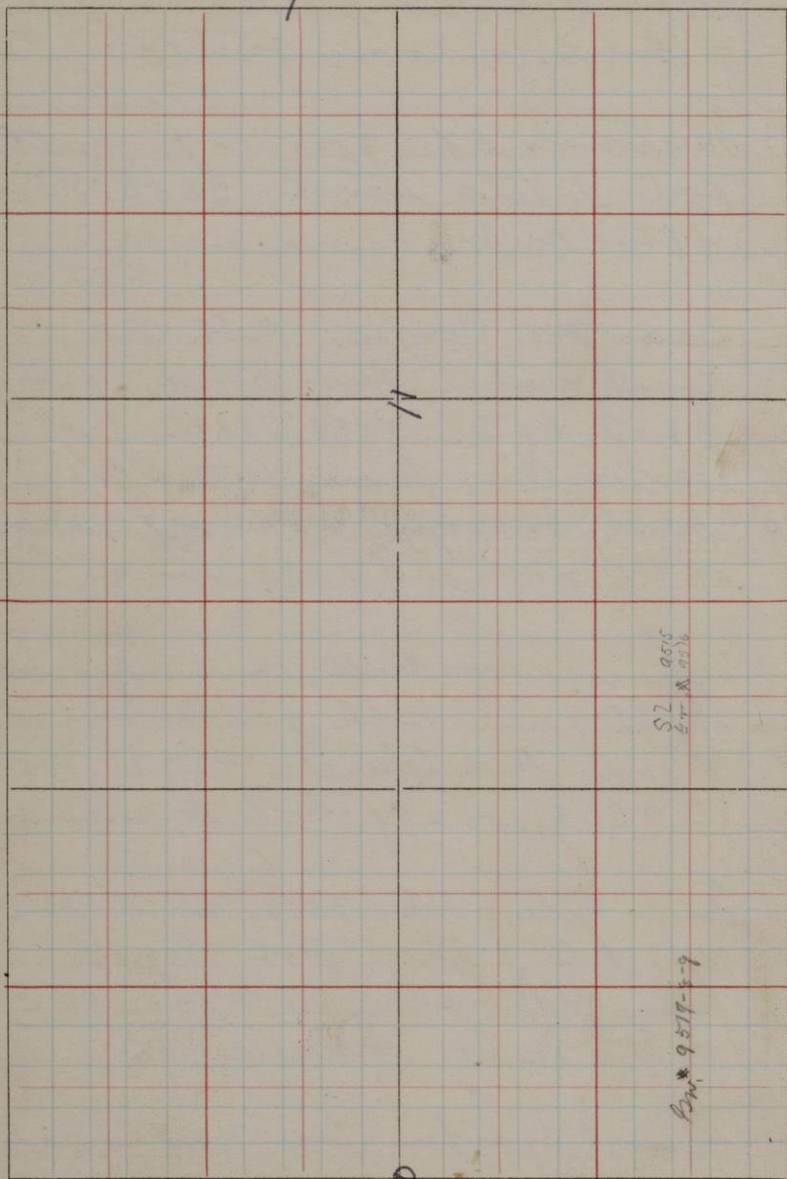
9010 Typical Quartzite, commonly found
north of ore, with bands and cherts
of ore. Test trench 420 S. 100 E.
to 430 S. 100 E. of the N. W. corner sec 13.

Quartzite, like 9010. with bands
and cherts of ore. Test trench
from 410 S. 50 E. to 470 S. 50 E
of the N. W. corner sec 13.

9011 Banded Jaspery Ore. south end
of same trench 480 S. 50 E. of the
N. W. corner sec 13.

T. 47

R. 46



SZ 255
255

9519-2-9

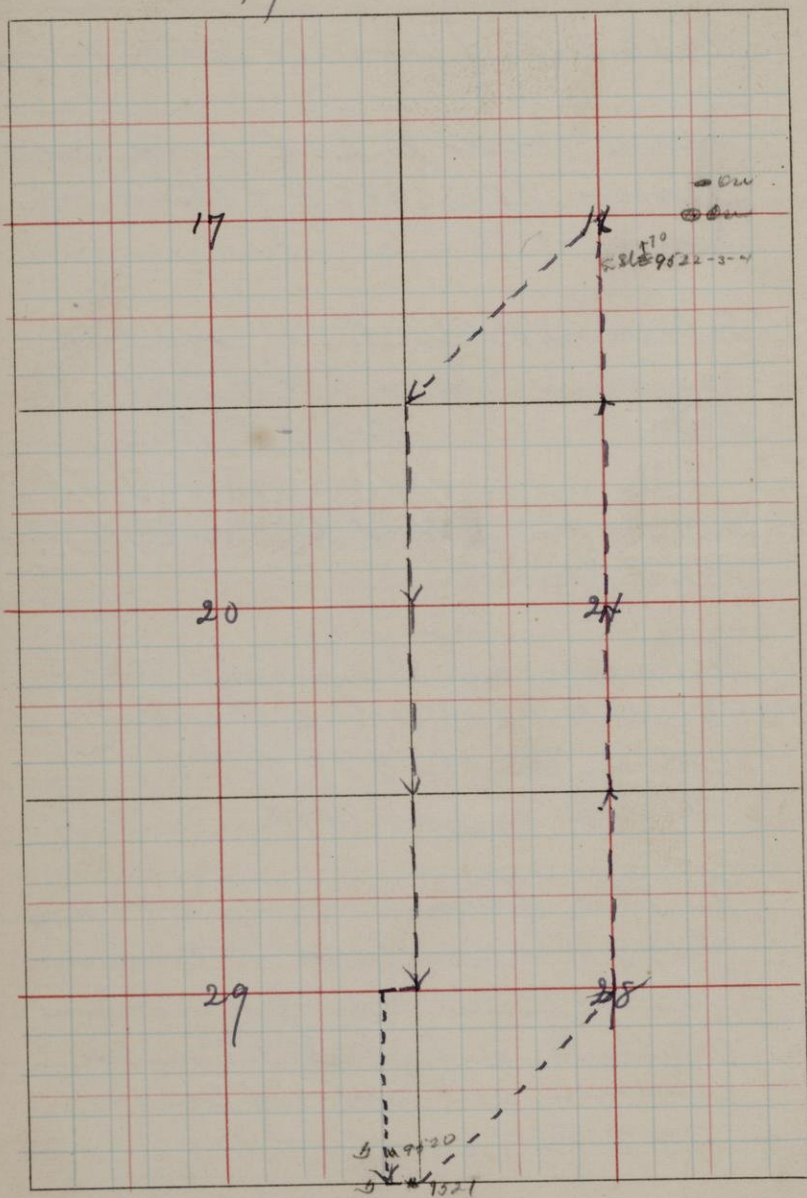
10

- 9512 Red and White Sandstone. Test pit.
 9513 4903.502. of the N. W. corner sec 13.
 9514 Gneiss. West end of large northern
 exposure. 7005 302. of the N. W.
 corner sec 13.
 9515 Siliceous Slate. Rail road cut.
 Near center SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec 11, 47, 46.
 Strike W. 21° S. Dip 78° N.
 9516 Greenstone. Found in contact with
 above slate
 9517 Greywacke and Greywacke slate.
 9518 825 N. 715 W. of the S. E.
 9519 corner sec 10, T47 R. 46
 Outcrop on railroad.

In the afternoon camp was moved
 along the rail road to Bessemer
 Camp ~~XXIII~~ and preparations
 made to go by rail to Pensacola,
 Bessemer, near center of sec 10,
 T47 R. 46

T. 47

R. 46



Wednesday, Aug 12, 1888.
 In the forenoon, starting at the center of Sec 16, T47, R46, (this point being reached by trail, we ran S. W. to the S. E. corner of Sec 16; thence south to the W $\frac{1}{4}$ post Sec 28; thence west 200; thence south to the south line of Sec 29; thence east to the S. E. corner; thence north east to the center of Sec 28; thence north to place of beginning the center of Sec 16.

9520 Granite. 180 W. of 250. of the E $\frac{1}{4}$ post Sec. 29

9521 Granite 40 W. of the S. E. corner of Sec 29.

9522 Siliceous Slate. Rail Road Cut

9523 775 N. 230 E. of the S. $\frac{1}{4}$ post

9524 Sec 16. Strike N. 30° W. Dip 70° N.

At the Colby Mine near Bessemer the beds of ss. are

found. Ore on the present date
is being shipped from each.

The ore is a soft hematite, so
soft that it can easily be picked
down and shoveled aboard the cars.

The surface of the south bed at
present uncovered is about 25 steps
wide and 60 steps long. The
center of this area is 1000 N.

8800 E. of the $5\frac{1}{4}$ post sec 16.

The north bed has an uncovered
surface 10 steps wide and 25 steps
long. Its center is 1140 N. 8800 E.
of the $5\frac{1}{4}$ post sec 16.

This bed is also worked by
shaft at 1140 N. 7000 E.

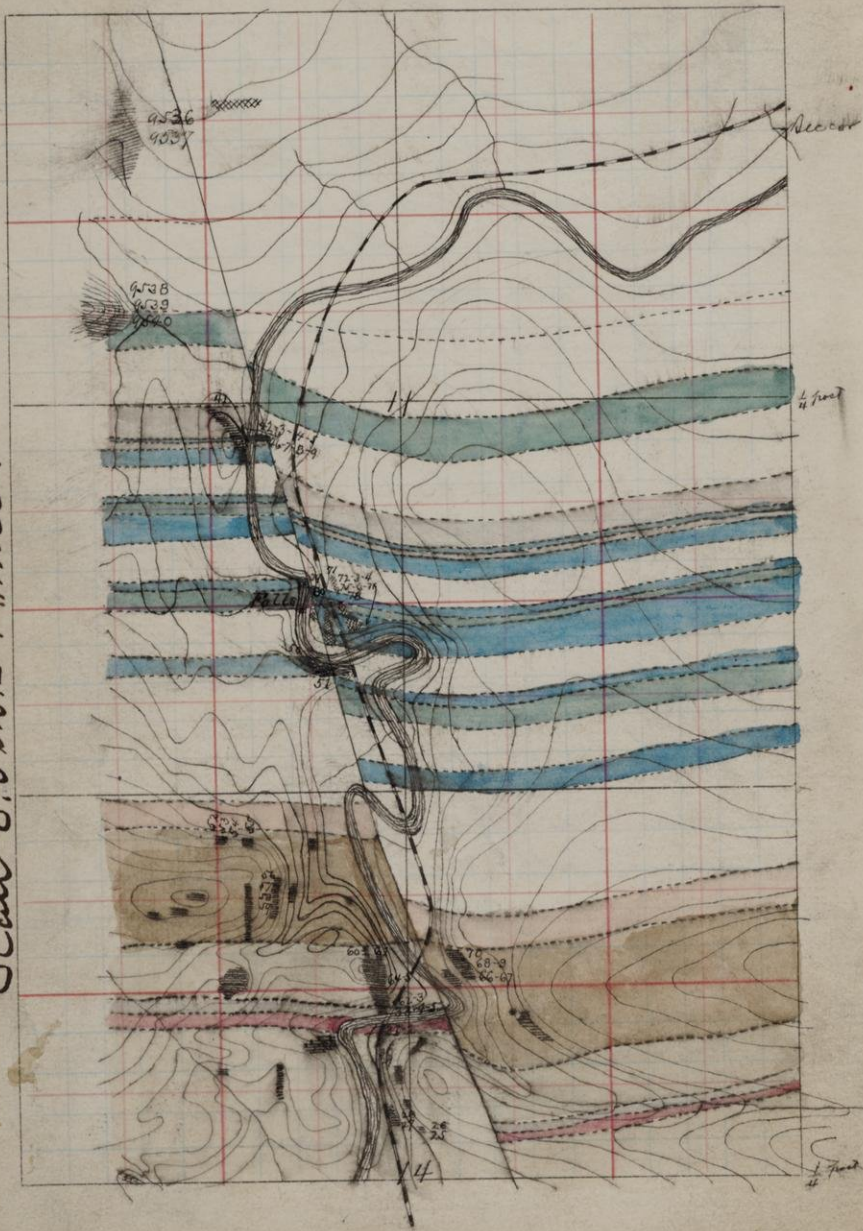
The north bed has upon its south
side the typical banded quartzite
which with shales and bands of
ore is so often found just north
of the ore in the region.

In the afternoon, took the
train to Ashland Camp XXIV

T. 44 N

R. 3 W. Secs 11 + 14.

Scale 3.6 in. = 1 mile.



Thursday, Aug 13, 1885-
In the forenoon took train to
Pensacola where place we
arrived at noon. Camp #IV
Rain prevented any work
in the afternoon

Friday, Aug 14, 1885-
The day was occupied in collect-
ing a typical suite of specimens
at Pensacola Bp. The forma-
tion numbers are from Irving.
The locations are indicated
by the accompanying map, which
is also from Irving. as are
also the names.

9525 Granite } The two are inter-
9526 Hornblende Schist } stratified

9527 Gneiss
9528 Mica Schist

9529 Hornblende Mica Schist
9530 Hornblende Schist

Wellsburg
Pensacola Bp

9531 Limestone } Formation II.
 9532 Limestone }

9533 Granular Gneissite. Form. III a

9534 Black Magnetitic Gneissite } II b
 9535 Black Magnetitic Gneissite }

9536 Mica Schist } ~~XXII~~
 9537 Mica Schist }

9538 Greenstone Schist } ~~XXIX~~
 9539 Greenstone Schist }
 9540 Greenstone Schist }

9541 Grey Gneissite } ~~XVIII~~
 9542 Grey Gneissite }

9543 Chirostolithic Mica Schist ~~XVI~~

9544 Grey Gneissite } ~~XV~~
 9545 Grey Gneissite }
 9546 Grey Gneissite }

9547 Black Chirostolithic Mica Slate } ~~XIV~~
 9548 Black Chirostolithic Mica Slate }
 9549 Black Chirostolithic Mica Slate }

9550 Dark Grey }
 9551 Micaceous } VII

9552 Garnet- }
 9553 iferous } IV C.
 9554 Schist }
 9555

9556 Magnetitic marzite }
 9557 Magnetitic marzite } IV b
 9558 Magnetic Ore }
 9559 Banded Mag. Ore }

9560 Grey marzite } IV a
 9561 Grey marzite }

Saturday Aug 15, 1885.
 9562 Steam colored & green }
 9563 Siliceous and chloro } III
 9564 Siliceous Schist }
 9565

9566 Actinolitic } IV c
 9567 Schist }

9568 Black
 9569 Feldspathic } V
 9570 Slate

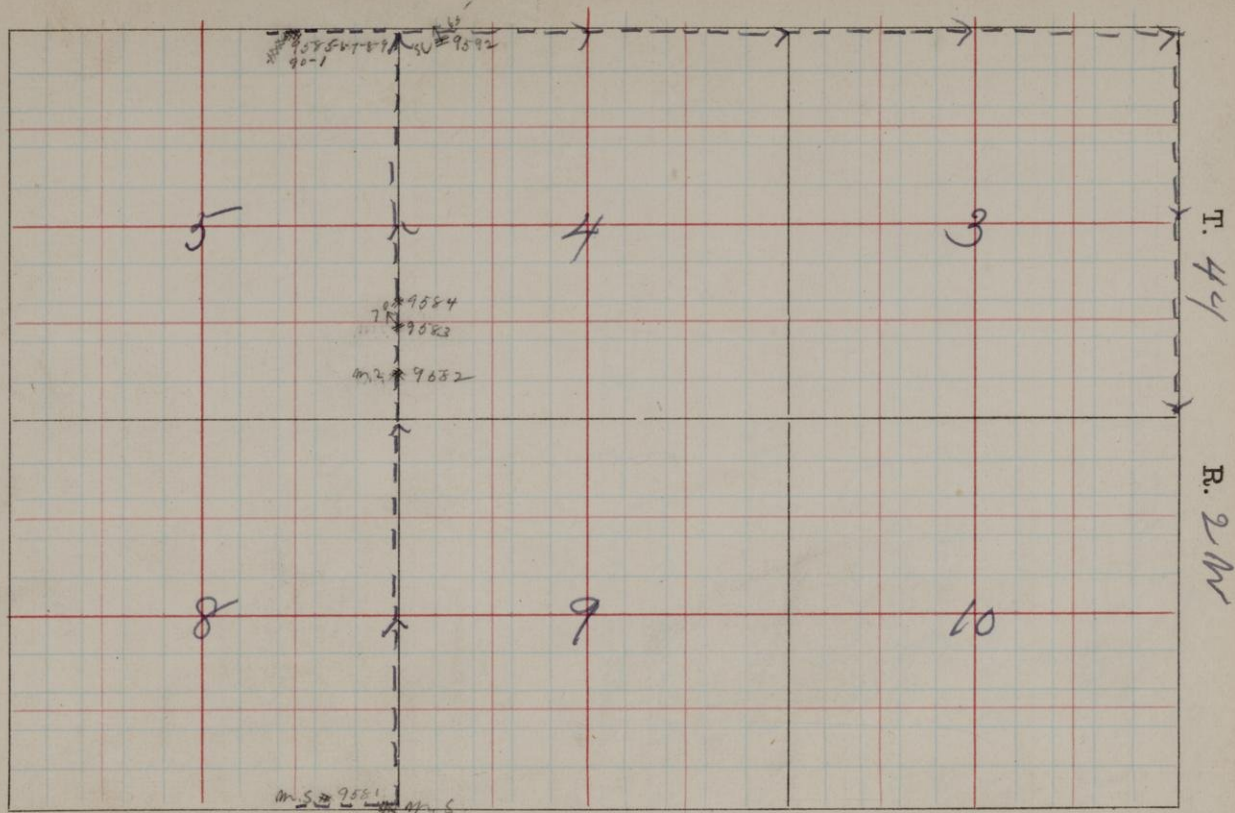
9571 Black
 9572 Magnetitic } XIV a
 9573 Mica
 9574 Slate

9575 Drift XIII

9576 Black mag.
 9577 ortho mi. } XII
 9578 ca slate

9579 Drift. IX
 9580

In the afternoon camp
 was moved to the S. E $\frac{1}{4}$
 Sec 8, T 44 R 2 W. XXVI



Sunday, Aug 16, 1885
 Starting at the S. E. corner of
 Sec 8, T 44 R 2 W. we went
 north to the N. E. corner Sec
 5; thence west 650; thence
 east to the N. E. corner Sec 8;
 thence south to the S. E. corner;
 thence to camp which had
 been moved to the S. E. 1/4
 Sec 1, Camp XXVII

9581 Coarse Micaceous Schist. 360 ft. 20 m.
 of the S. E. corner Sec 8.

Same upon north side of high
 hill from 60 ft to S. E. corner
 Sec 8.

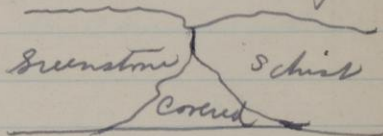
9582 Micaceous Marble, 220 ft.
 of the S. E. corner Sec 5.
 Southern exposure.

9583 Banded Micaceous Schist. Southern
 exposure 440 ft. of the S. E. corner
 Sec 5. Strike N 27° S. Dip 70° N.

9384 Mica Schist 600 M. of the
S. E. corner Sec 5. Northern exposure.

Running west upon the north
line of Sec 5, the west face of a
granstone ledge is met at 440
M. of the S. E. corner of the section.
It then takes a sharp turn and
follows the line closely until 470-
M. Here the range swings south
of the line and at 540 M. 20 S.
it bears W. 25 S. The range
was followed to 640 M. 100 S.
At 540 M. 20 S. mica schist
appears at the base of the
cliff and continues along its
base to 585 M. 60 S. The con-
tact, so far as it could be
followed is a tolerably regular
one. Where first found it
cuts toward the top of the
ledge at a low angle, but does
not reach the top of the hill
granstone being here found
to 640 M. 100 S. where the
granstone disappears and
mica schist is found.

The two at this place come together in nearly a vertical line so far as can be seen in the space of two or three feet, the distance the contact can be seen. This contact in section is something like the following



- 9585 Greenstone at Contact 540 W. 20 S.
 9586 Micaceous Schist at Contact 540 W. 20 S.
 9587 Greenstone 2' from contact 540 W. 20 S.
 9588 Micaceous Schist 8' from contact 540 W. 20 S.
 9589 Greenstone 640 W. 130 S.
 9590 Micaceous Schist 640 W. 130 S.
 9591 Micaceous Schist 580 W. 60 S.

It will be seen from the above that the greenstone overlies and cuts through the micaceous schist.

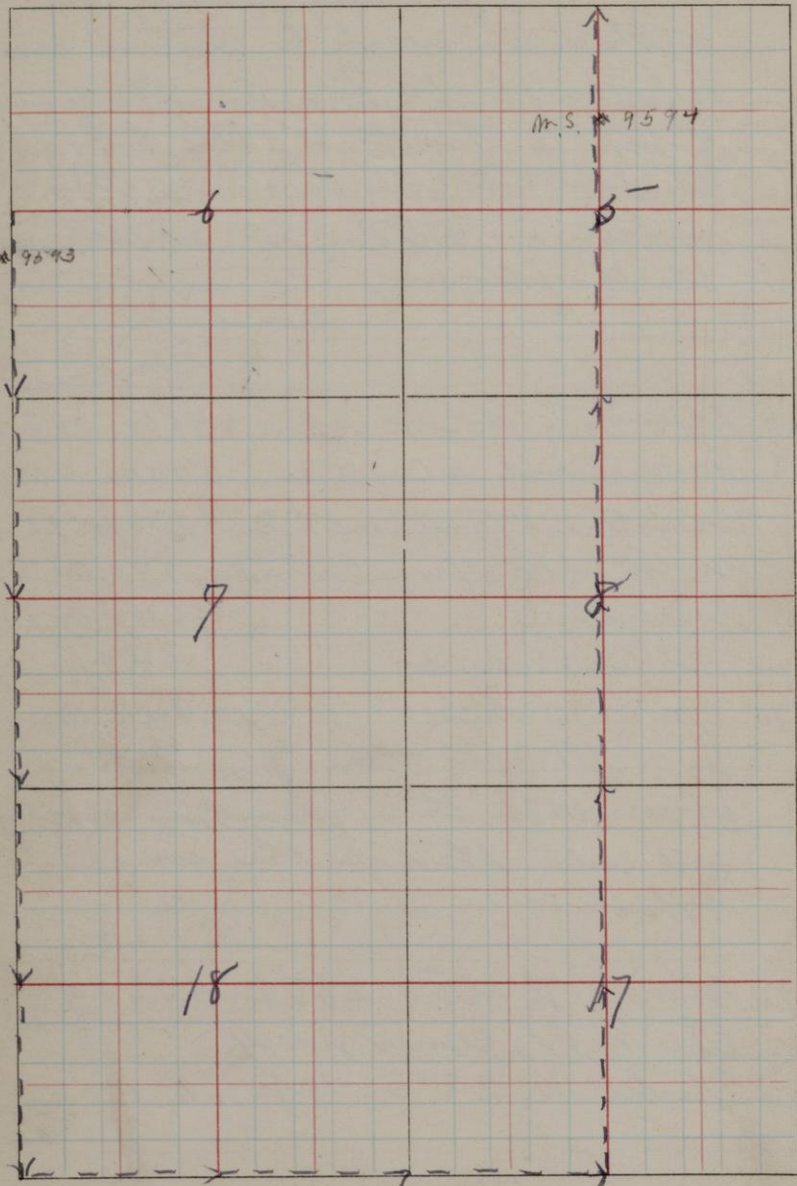
- 9592 Black Slate. 250 E. 50 S. of the N. W. corner Sec 4.
 Strike W. 22° S. Dip 60° N.

T. 44

R. 1W

56.2 * 95.93

Mr. S. * 95.94



Monday, Aug 17, 1885.
 Starting at the $N\frac{1}{4}$ post of sec
 6. T 44 R 1 W, we run south
 to the S. W. corner of sec 18;
 thence east to the $S\frac{1}{4}$ post sec 17;
 thence north to the $N\frac{1}{4}$ post
 sec 5; thence to camp which
 during the day had been moved
 to the $N. 2\frac{1}{4}$ sec 33, T 45 R 1 W,
 at the gorge of Taylor's Fork.
 Camp XXVIII

9593 Slaty Quartzite. 2605. 35' W.
 of the $S\frac{1}{4}$ post sec 1, T 44 R 2 W.
 Small southern exposure.
 Strike W 280 S. Dip 60° N.

9594 Micaceous Schist. Southern ex-
 posure 1460 W. of the $S\frac{1}{4}$ post
 sec 5, T 44 R 1 W.

T.

10402

R.

12683-4-5

12686-7 127034

9396-7

12783-4

