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## **Marquette, Michigan region, greenstone area north of Ishpeming and Teal Lake and region south of Ishpeming to the granite. No. 128 1891**

Luther, Geo. E.

[s.l.]: [s.n.], 1891

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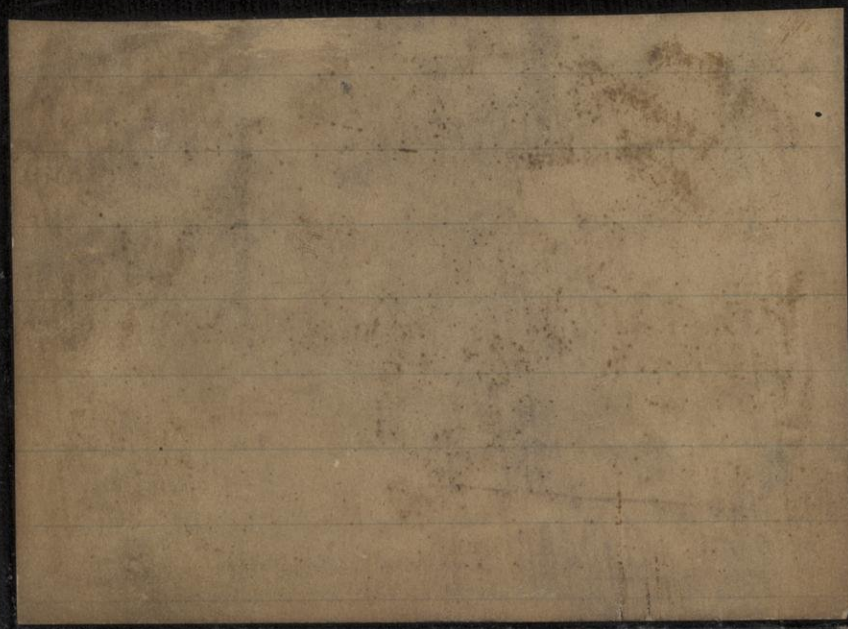
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U. S. GEOLOGICAL SURVEY  
FIELD SECTION BOOK



# 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 page is also arranged so that, if desirable, a smaller scale can be used, two inches, one inch, or even 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, 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. 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, but chips of them must be taken. 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. In all cases collect chips for slicing. 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. It is desirable that specimens 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.

#128

2. ( ) 47

22001 - 22215

## Marquette Region.

Greenstone area north of Ishpeming  
and Teal Lake and Region  
south of Ishpeming to the granite.

Aug. & Sept 1891.

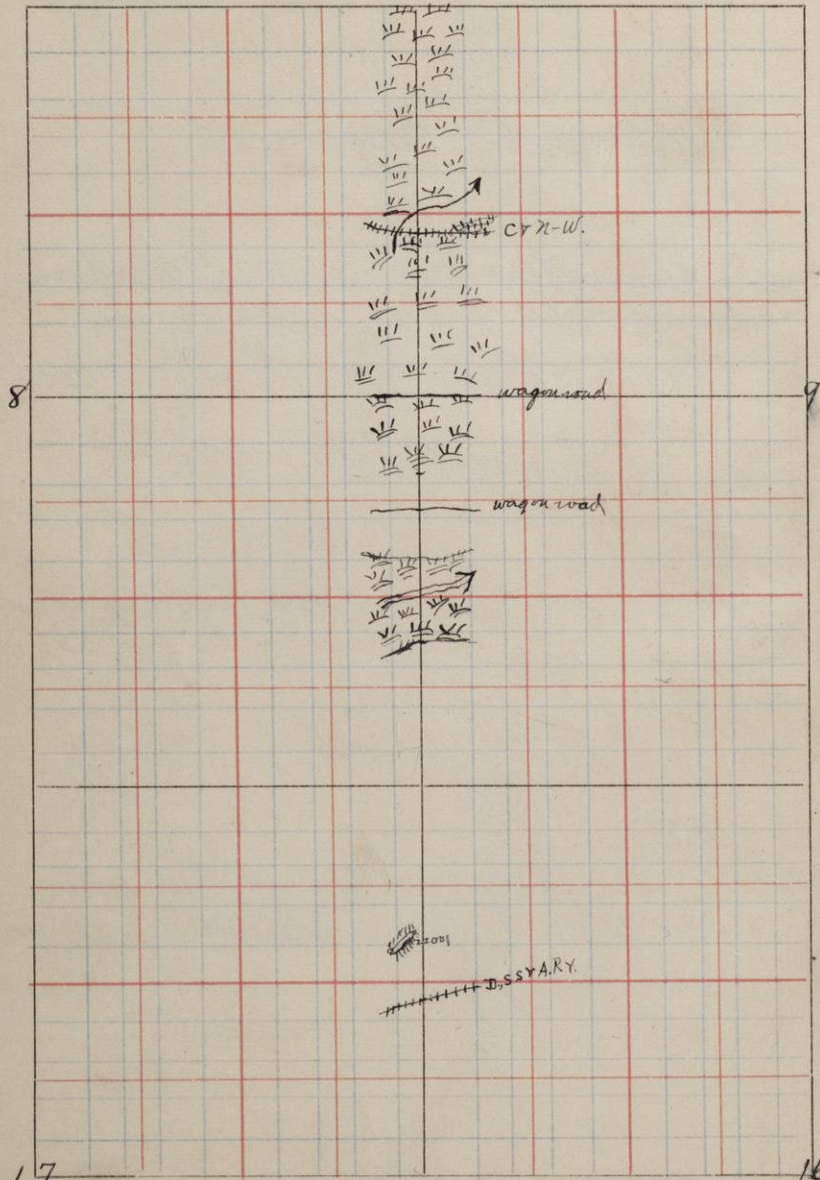
Geo E Luther  
Chas Key, Compassman

A.B.

The strikes and dips in these notes  
were taken by Key under instructions  
from Dr. Bayly.

Sec's 17 & 8 T. 47

R. 27 Mich.



1

Lake Sally (Ishpeming) Michigan.  
Wednesday, Aug. 12, 1891.

Began work at the E  $\frac{1}{4}$  post of Sec. 17  
T. 47 N., R. 27 W., Mich. and ran north to  
the northeast corner of Sec. 8.

Not an exposure was seen during the  
distance. The country north to the  
southeast corner of Sec. 8 is composed of  
low, drift covered hills, and along the  
east line of Sec. 8 is mostly all swamp.

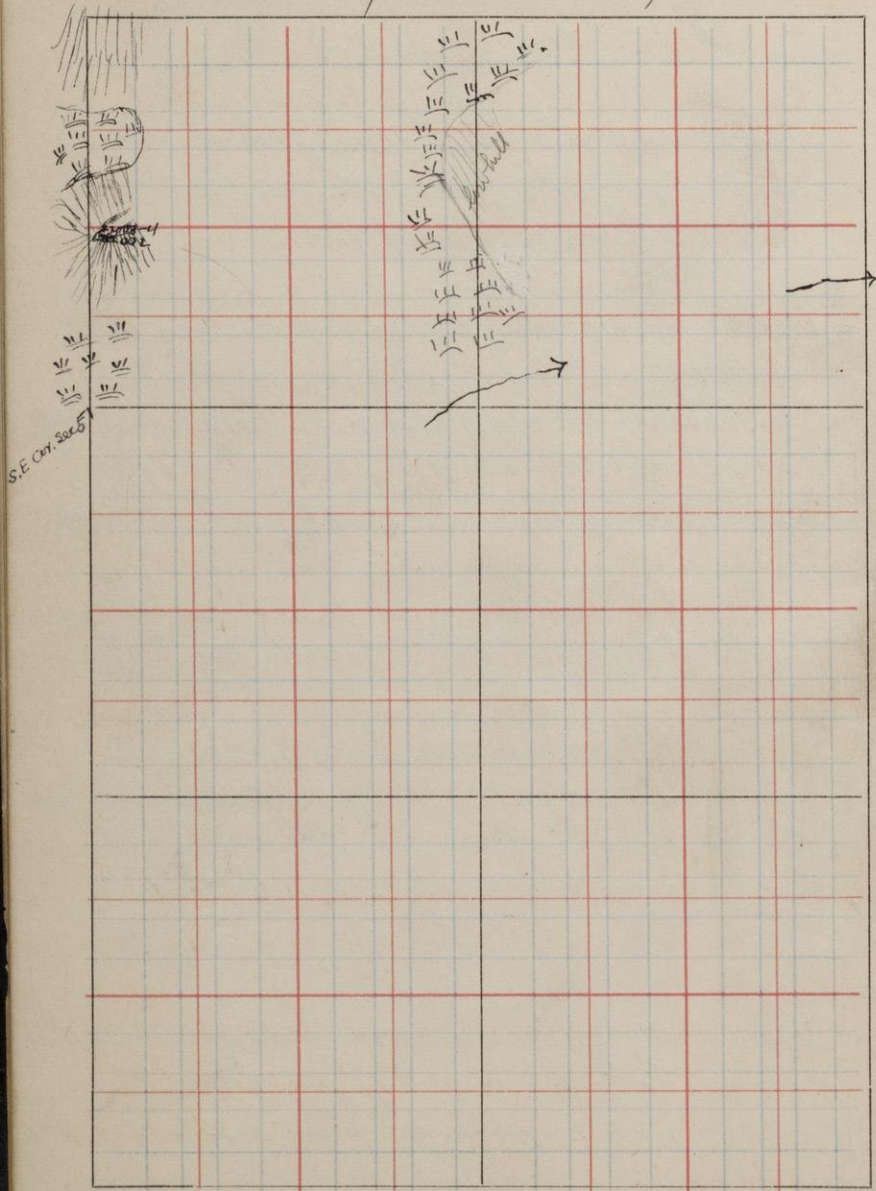
The 500 post of Sec. 8 is of iron, on the south side  
of the stream, placed there by the Iron Cliffs Co.

The northeast corner of Sec. 8 was not  
found, The day was cloudy and dial compass  
could not be used all the way.



Sec 574 T. 47

R. 27



Thursday August 13, 1891.

Started in at point where the east line of Sec 17-47-27 crosses the D. S. & A. Ry and continued north on the route of yesterday to attempt to find Northeast corner Sec. 8.

- ✓ 22001  
G.W. 1600 N., 50 W. SE corner Sec. 17. Quartzite, iron stained. Ledge 65 paces in length, although exposure not continuous. Trend of exposure NE & SW; dip  $40^{\circ}$ ? N.

The northeast corner was made to be on edge of swamp, but was not found

From northeast corner Sec 8 continued north along the east line of Sec. 5.

- ✓ 22002  
S. 240 N. 1980 W. SE corner Sec 4. A black schistose rock. Strike W.  $10^{\circ}$  N; dip  $45^{\circ}$  S?

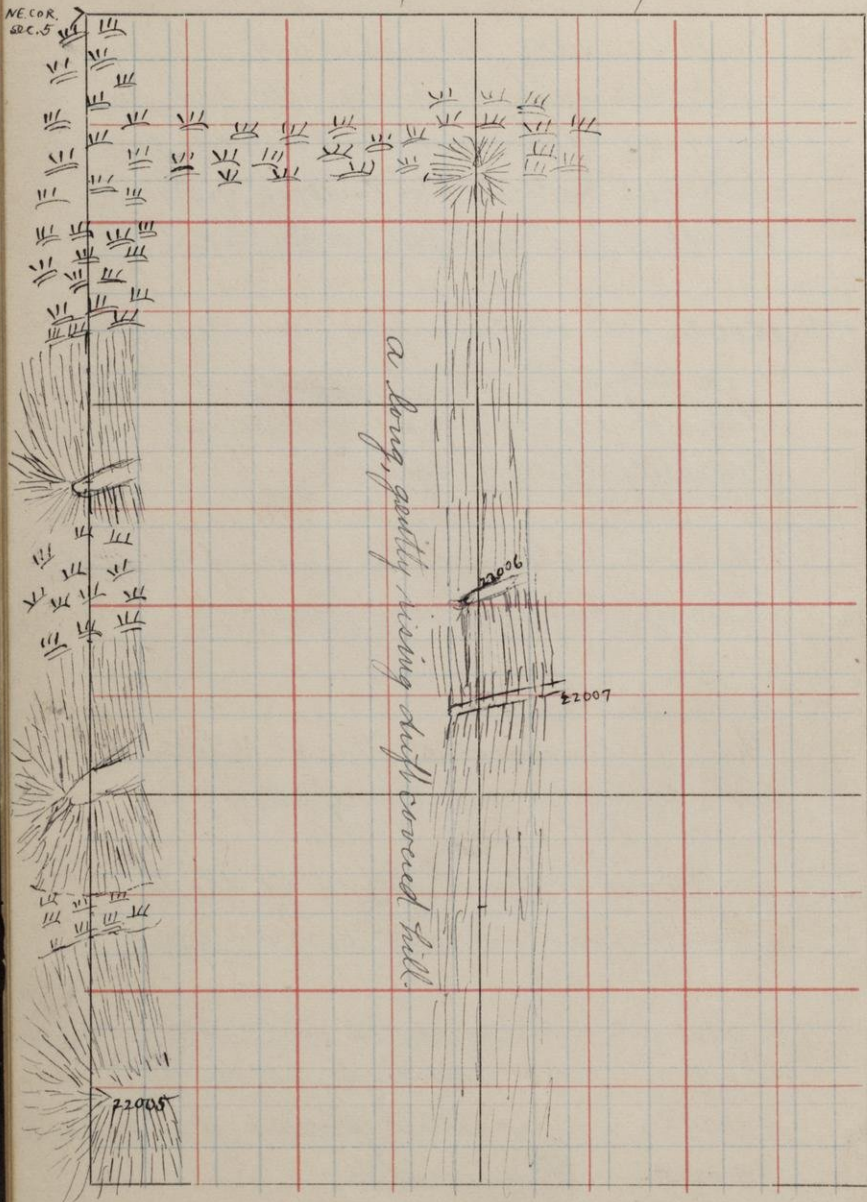
- ✓ 22003-4  
S. S.S. fine grained laminated rocks about 20 feet north of 22002, and higher on the hill. 22004 is a more altered phase. Strike W  $10^{\circ}$  N dip  $45^{\circ}$  N? Graywackes.

Sec 14 T.

47

R. 27

NE COR.  
S.E.C. 5



22005  
2.

600 N. 1980 W. Sec 4. Quartzite. Ledge shows for about 60 paces trending in a N.E.-S.W. direction. This quartzite is also found at 630 N,<sup>0W</sup> and at 640 N. 10 W.

820 N. 0 W. small swamp about 30 feet across. Then went up a high drift-covered hill which extended to 1200 N. North of this hill is another swamp which continues to 1350 N, when a second drift covered hill was crossed. This second hill extends to 1600 N, and then a third swamp was struck, which continued until the corner was reached.

The corner was found at 1925 N. Oley explained the apparent discrepancy in pacing to be due to the fact that this section is in the north tier of sections of the township, where any errors in the original survey would have been corrected. The corner is represented by a <sup>squared</sup> stick about 4 feet high. The witness trees of Secs. 5, 32, 33 are standing. There is a little lake about 45 paces west of corner.

Saturday, August 15, 1891.

Began work at NE corner Sec 5-47-27. Ran south 200 paces to get out of swamp; then east 500 paces.

At 425 E came to edge of swamp and ascended a low drift covered hill. At 1800 N. 1500 W. Sec. 4, ran south to swamp near south end of section.

✓ 22006  
I.C.

1270 N., 1500 W. Banded and contorted chert rock. Exposure can be traced for 40 paces in a direction a little north of east and south of west. The strike is  $E 5^{\circ} S$ ; dip  $68^{\circ} S$ .

✓ 22007  
I.J.

1125 N 1400 W. is an exposure of iron ore. The exposure is about 12 paces wide and 125 paces long. There is a test-pit in the same material just south of where specimen was taken. Strike  $E 10^{\circ} W$ ; dip  $70^{\circ} S$ . So far as seen the hill is all drift covered except where the above two ledges occur.

Struck swamp at 200N 1500W. At this point turned east 500 paces and then went north to the north line of the section (4)

(On the run south Oley made the paces 1935 as on the first run north. He also had the same number of paces on the second run north.)

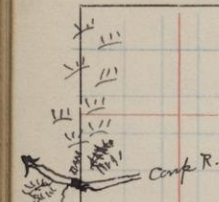
On the run north test pits were met with at 1300N 1000W., 1325 N., + 1500N., and a little beyond 1500N. These pits were in drift and no rock was seen about them.

✓22008  
S. 1670 N 1050 W. Exposure of slate about 40 paces long. Strike and dip could not be gotten.

At the W<sup>1</sup>/<sub>4</sub> post of the section went east 500 paces and then south to swamp again. No rock was seen. The country going east is swampy, and the only hill crossed on the way south was covered with drift. At 1575 N, 500W. the swamp was met with, and also

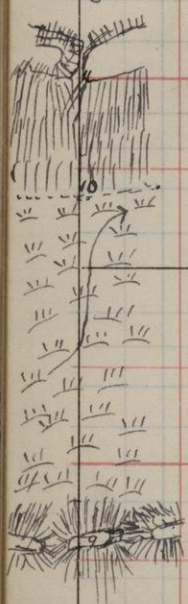
Sec. 28733 T. 48 N

R. 27 W. Mich



SW. Cor. 28  
NW. Cor. 33

cultivated strip



W 1/4 road

the railroad leading to the Deer Lake  
Furnace. Direction of road S 10° W.

Camp on Deer Lake Road, north of Ishpening.  
Monday, August 17, 1891.

Began at the W 1/4 post of Sec 33-48-27  
and ran north to the northwest corner  
Sec. 28.

✓ 22009 1140 N. 2000 W. is a large exposure of  
G.S. & G.C. greenstone<sup>conglomerate</sup>. The north side of this  
hill is very steep. at 1200 N. entered swamp.

✓ 22010 at 1580 N. we left swamp and came to  
G.S. & G.C. another large exposure of greenstone  
conglomerate like 22009.

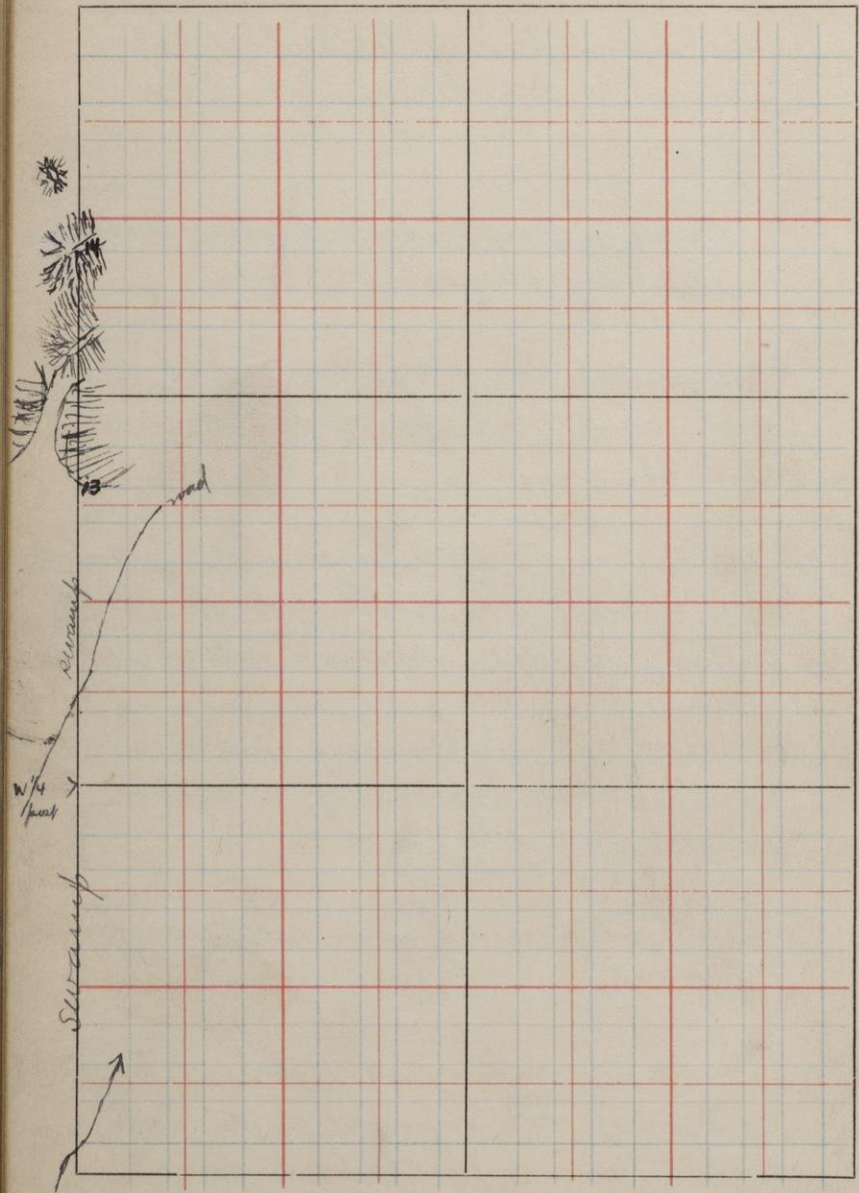
✓ G.S. & G.C. Another exposure of same rock was found  
at 1640 N.

✓ 22011 1750 N. is a long and high exposure of  
G.C. greenstone<sup>conglomerate</sup>. This exposure on its north  
side is 30 or 40 feet perpendicular.



Sec 28 T. 48 N

R. 27 W Mich.



The corner was not found,

150 N. 2000 W. Sec 28-48-27. came to wagon road. about 125 paces W on road from where we struck it is a <sup>little</sup> stream that flows into the Camp river near the dam.

✓ 22012  
[spec. lost]  
G. 150 N. 150 W. Sec. 29-48-27 <sup>is</sup> a bluff of greenstone. The east face of this bluff is 30 to 40 feet high.

✓ G 275 N and a short distance west of the line, by the edge of a swamp, is another exposure of greenstone. This is on the south side of the Camp.

✓ G 325 N. 2000 W. Sec 28-48-27 on the north side of the Camp is more greenstone. From this place to 540 N. where the river was again struck the country is swamps. This swamp continues to 1425 N. At 1125 N. came to a wagon road.

✓ 22013  
G. P 1425 N is a very large exposure of peridotite?, covering a hill about 40 feet high. A hill to the west of the line is composed of the same kind of rock.

✓ 22014  
G.P.

1700 N. 2000 is weathered peridotite? The peridotite continues until the corner is reached.

At the northwest corner of the section 28, turned east 1100 paces.

✓ G.P.

On the way east, for a distance of 300 paces are exposures of this peridotite rock. Beyond this the country is drift covered for some distance.

✓ G.P.

At 2000 N. 1500 W. the same rock is again found occupying the barren knobs. masses were taken as they should come but near here

✓ G.P.

At 1300 W. 2000 N. struck wagon road, and on the south side of road is another exposure of this peridotite rock.

At 900 W. 2000 N. ran south.

✓ 22015  
G.P.

1970 N. 875 W. the same rock is again found in large exposure. This same rock is seen to the east of our line to 1900 N. 900 W.

✓ G.P.

at 1860 N. 1100 W ran west to 1000 W. In doing so ran along a ridge of the peridotite.

✓ 22016  
G.P.

1740 N. 1000 W. Peridotite covering a large hill extending east and west, with a very precipitous south face.

The exposures of peridotite occupy huge knobs, and as the country has been tamed over quite recently, they stand out very prominently. At bottom of this hill enter a swamp which continues to 600 N. 1000 W. Crossed the Carp River at 490 N.

✓ 22017  
G.S.  
G.S.

485 N. 1000 W. Greenstone conglomerate Exposure begins at 500 N & continues to about 300 N.

✓ 22018  
G.C. & G.S.

300 N. 1000 W. south side of above exposure.

120 N. 1000 W. another exposure of greenstone

at the bottom of this exposure the swamp bordering the Carp River begins.

The river was estimated to be at ~~200~~ 0 N. 1000 W.

Tuesday, August 18, 1891.

Started at the E $\frac{1}{4}$  post of Sec 33-48-27 and ran north to the corner. The corner was not found, being in swamp bordering Carp River. No exposures were seen going to the corner. By means of a post found later we found the corner on our run north on Sec 27

Continued north on west line of Sec. 27 to the quartzite on the west line of Sec. 15.

✓ 22019  
G.C. 180 N. 2000 W. Sec. 27-48-27 Hill of greenstone conglomerate extending NE & SW. At 350 N is the north<sup>east</sup> side of this hill,

Between this exposure and the next one north a part of the country is swamp.

✓ 22020  
G.C. at 500 N. left swamp and came to a small ledge of greenstone conglomerate. Specimen was taken at 550 N., top of hill. Beyond this hill is another swamp, very small, after which on the line are low hills without exposure.

1 G. 750 N. 60 W. is a small exposure of greenstone.

✓ 22021 750 N. 1925 W. Sec. 27-48-27 is a large exposure of a rock that as a soapy feel. The west end of this exposure is about 50 feet high and very precipitous.

✓ 22022 850 N. 1925 W. West end of another high cliff of steatite? or soap-rock.

The country from here to 1050 N is low and without exposure. At 1050 N. entered swamp, which continues to 1250 N. The Camp River was struck at 1110 N. After leaving the swamp the country was again low and without exposure until 1550 N.

✓ 22023 at this place came to foot of hill of greenstone. The hill rises very abruptly from the swamp and extends in an east and west direction across our line. Specimen was taken at 1600 N.

✓ 22024 1700 N. 2000 W. A large exposure of greenstone?

✓ 22025 1800 N. 2000 W. Same kind of rock as 22024, on north side of next hill <sup>to north</sup> beyond of the one 22024 was taken from. This is a

small exposure, about 15 feet long.

✓ 22026 G.S. 115 N. 2000 W. Sec 22-48-27, is an exposure of greenstone conglomerate

✓ 22027 G.S. 230 N. 2000 W. enter swamp and at 270 N. leave swamp and come to little exposure of greenstone. This exposure is cut by a quartz vein two feet across.

✓ G.S. 360 N. northern side of another hill of greenstone.

✓ 22028 G.S. 410 N. an exposure of schistose greenstone. Hill extends N.E.-S.W. and about 100 paces across.

From the foot of this hill the country is low or swampy until 1150 N. is reached. Here is quite an exposure of greenstone.

✓ 22029 G.S.

at NW corner Sec. 22 ran north 500 paces and returned to corner.

22030 Q. 500 N. 2000 W. Sec 15-48-27. Quartzite. The exposure extends in an E-W direction and is

about 50 feet long.

22031 390 N. 1950 W. Sec 15-48-27. Medium-sized exposure of greenstone. Between this exposure and the quartzite is a narrow swamp.  
G.S.

22032 230 N. 2000 W. is an exposure of greenstone  
G.S.

From northwest corner Sec. 29, ran south 150 paces, then east 1000 paces.

22033 1850 N. 1000 W. is a large <sup>high</sup> greenstone ridge which has extended from the corner.  
G.S.

at ~~2000~~<sup>1850</sup> N. 1000 W. ran south to Deer Lake.

On the run south the country is low and swampy until 725 N. 1000 W. is reached.

Here is a small exposure of greenstone conglomerate cut by small quartz veins  
22034 G.S. 19 C.

22035 The country south is low and swampy again until 420 N. is reached, where occurs a small exposure of greenstone schist.  
G.S.



From here no rocks were seen in Sec 22,

✓ 22036 1950 N. 1000 W. Sec. 27-48-27 is an exposure of  
G.S. & G.C. greenstone conglomerate.

✓ a South of this is a narrow swamp, on leaving which we come to another exposure of greenstone 1800 N. Greenstone occurs continuously from this point to 1500 N.

✓ 22037 After crossing a narrow valley we come to  
G.S. a large exposure of greenstone. This is 1600 N. and a short distance west of the 1000 line.  
T

Wednesday, August 19, 1899.

Started at 270 N. 1000 W Sec. 27-48-27 and ran north 1500 paces

On our way to starting point, at 270 N. 1130 W came to exposure of greenstone conglomerate which continues east beyond the ~~1000 paces~~<sup>N.S.</sup> 1/4 line. One of the specimens is quite quartzitic looking. Running across the summit of this hill is 22040, a dike <sup>roughly</sup> of finer grained greenstone.

✓ 22039  
G.C.

✓ 22040  
G.

✓ G.C.

400 N. 1000 W is another exposure of greenstone conglomerate.

✓ 22041  
G.S.

650 N. 1000 W. Sec 27-48-27. exposure of greenstone.

✓ 22038  
G.

and a short distance west of the line 700 N. is a large exposure of greenstone extending for about 100 paces. Specimen taken from north side of exposure; <sup>cherty</sup> quartzitic looking?

825 N. (about) struck swamp, which continued to 1050 N.

✓ 22042  
G. We then came to a high exposure of greenstone, Beyond this is swamp again

1550 N. is stream in swamp.

✓ 22043  
G.S. On leaving swamp came to an exposure of schistose greenstone. Location 1600 N. 1000 W.

at 1600 N. ran east.

✓ 22044  
G.S. 125 E. is an exposure of greenstone conglom-  
 ✓ 22045  
G. erate. This is cut by 22045 a diabase dike 12 feet wide. To the east of the dike  
 ✓ 22046  
G.S. greenstone conglomerate is again found.  
 G.S. 22045 is from 1600 N. 850 W. Sec 27.  
 ✓ 22047  
G. contact of conglomerate <sup>22046</sup> and dike. <sup>22045</sup>  
 ✓ 22048  
G.C. Pebbles from 22046.

✓ 22049  
G. The country between 22044 and 22045 is almost entirely covered, but in one place 22049, a coarse greenstone was found.

at 850 W 1600 N. went south.

✓ 22050 1200 N. 725 W. Sec 27. is a high hill of peridotite.  
Q.

After dinner began at the W 1/4 post of Sec. 34-48-27 and ran east 300 paces.

✓ 22051 985 N. 1780 W. Came to wagon road at 1000 N. 1900 W. and just on the east side of the road occurs, 22051, green schist, iron stained. Exposure about 75 paces long. Strike W 15 S; dip 80° S.

✓ 22052 985 N. 1780 W. Further east is found a talcose rock or greenstone. The eastern end of this exposure is cut by quartz veins of small size.  
Q. L. ?

At 1780 W. 1000 N. came to C & N W. Ry leading to Deer Lake Furnace.

✓ 22053 985 N. 1780 W. Quartzite. Forms a ridge about 100 or 75 paces long, running out under the Corp river. Strike 5° S of W; dip about 70° S.  
Q.

at 300 E turned north

✓ G.C. 22054 1170 N., 1700 W. along the railroad is found greenstone conglomerates in small exposure  
22055  
Q.

22055 is cut by small quartz veins.

✓ 22056 1300 N. 1725 W Sec 34-48-27 is a small exposure of greenstone by the side of the railroad track  
G.S.

✓ G.C. 1375 N. 1725 W is another exposure of greenstone conglomerate.

✓ 22057 1500 N. 1725 W. is another exposure of greenstone  
✓ G.S.  
✓ G.C. conglomerate, with a frontage of about 30 feet along the railroad.

1750 N. Brings us to swamp bordering Carp River. Here went east ~~200 p~~ to 1750 N. 1500 W. and then south to the south line of the section.

✓ 1700 N. 1400 W. came to Deer Lake.

✓ 22058 1400 N. 1470 W. Sec 34 is a large exposure of greenstone conglomerate, just back of the village of Deer Lake.  
G.S. G.C.

At 1300 N. 1500 W is a swamp 75 paces across.

- ✓ G 1275 N. 1500 W. is a very small of greenstone.  
Higher up on same hill, at 1210 N. 1500 W is
- ✓ G another exposure of greenstone.
- ✓ 22059 ✓ 1176 N. 1500 W. is summit of the hill on which  
the above two exposures occur. Greenstone  
conglomerate.
- ✓ G.S.  
✓ G.C.
- 1100 N. 1500 W. is Ithpening-Durr Lake wagon road.

Friday, August 31, 1891.

Started at place left off Wednesday (1100 N.  
1500 W. Sec 34-48-27) and ran south.

- ✓ No exposures were seen until 1000 N. 1530 W  
is reached. There is a low knob of quartzite
- ✓ 22060  
G.

at 1000 N. 1500 W. went east to 1200 W.

Ithpening-Durr Lake road crossed again at  
1000 N. 1350 W.

at 1000 N. 1300 W. is another small exposure of  
quartzite. Our camp was about 100 paces  
east of this exposure.

1 G.

- ✓ 22061 1100 N. 1200 W. west end of quartzite ridge extending from this place east to near Teal Lake.  
Q.
- ✓ 22062 Small exposure of greenstone conglomerate at 1160 N. 1200 W. The country between the quartzite and this place is covered and wooded and known as Deer Lake Grove.  
G.T.G.C.
- ✓ G.C. The same greenstone conglomerate is found at 1250 N. and 1300 N. 1200 W. but only in small exposure.
- At 1515 N. 1200 W. came to Deer Lake. Not an exposure was seen from 1300 N. to this place.
- At 1515 N. 1200 W. went east 200 paces.
- ✓ 22063 1475 N. 1000 W. small exposure of greenstone schist. The exposure is only about 15 or 20 feet long, and but a few feet high. The surrounding country is low and swampy.  
G.S.
- ✓ 22064 1465 N. 1000 W. a less altered phase of 22063. This is cut by very small quartz veins.  
G.S.

- ✓ 22065 1400 N. 1040 W. in the middle of wagon road  
G.S.T  
G.C. is a very small exposure of greenstone  
conglomerate.
- ✓ 22066 1100 N. 1000 W. exposure of greenstone conglomerate,  
G.S.T  
G.C. with soapy feel.
- ✓ 22067 1090 N. 1000 W. near summit of hill from which  
c. 22066 was taken is a small exposure of  
greenstone conglomerate. The pebbles run from  
minute to those ten inches in length.
- ✓ 22067A Pebble from above conglomerate.
- Q 1050 N. 1000 W. came to quartzite hill. The  
country between the conglomerate and quartzite  
is without exposure. This quartzite  
extends to about 950 N.
- From 1000 N. 1000 W. went east 250 paces;  
then north to the lake.
- ✓ 22068 1080 N. 750 W. exposure of quartzite. This is  
Q. a continuation of the quartzite ridge to the  
westward.



✓ 22069 G.S. & G.C. 1250 N. 750 W. Exposure of greenstone conglomerate. This is but a small exposure, about 35 paces in length.

✓ G.S. & G.C. 1315 N. 750 W. this rock is again seen in larger exposure. From here to the lake the country is without exposure.

1500 N. came to a wagon road.

✓ 1625 N. came to Deer Lake. At this point turned East 250 paces.

✓ 22070 G.S. & G.C. 1625 N. 710 W. exposure of greenstone conglomerate about 60 paces N & S. and 20 E & W.

✓ 22071 G.S. & G.C. From same exposure; more schistose?

✓ G.C. 1625 N. 660 W. Larger exposure of greenstone conglomerate. South side of exposure about 20 feet perpendicular. 1650 N. 580 W. is eastern end of this exposure.

at 500 W. ran south. 1560 N. 500 W. came to a wagon road.

✓ 22072 G.S. & G.C. 1470 N. 500 W. medium-sized exposure of

✓ greenstone conglomerate.

✓ 22073 1460 N. 500 W. is a large exposure of  
G.S. + G.C. greenstone conglomerate. About 100 paces  
long (E-W) by 40 wide.

✓ G.C. 1280 N. 500 W. Another small exposure of  
greenstone conglomerate. The country between  
22073 & this point is without exposure.

✓ 22074 1225 N. 500 W. Large exposure of greenstone  
G.S. + G.C. conglomerate,

✓ 22075 1200 N. 500. on south side of above hill is found  
Q. L. 2 schistose greenstone. Strike  $5^{\circ}$  S of W; dip  
about  $90^{\circ}$

✓ 22076 1100 N. 500. Quartzite. The country between  
Q. the 22075 and 22076 is without exposure.

Saturday, August 22, 1891.

after dinner began at E 1/4 post Dec 34-48-27 and ran north to corner. 1/4 post is at west end of Teal Lake.

- at 1140 N. struck lower edge of the quartzite ridge. 1200 N. is top of ridge and here specimen was taken.
- ✓ 22077  
Q
- ✓ 22078  
G.S.  
22079  
Q.S.
- 1250 N. SW. Small exposure of greenstone. 22079 is higher up on hill than 22078 and more schistose. Search was made for the contact of the quartzite and greenstone, but could not be found. 22078 & 22079 are not a continuous exposure.
- ✓ 22080  
G.S.
- 1325 N. Small round knob of greenstone.
- ✓ 22081  
G.S.
- ✓ 22082  
G.S.
- 1380 N. SW. Small exposure of schistose greenstone. 22081 from south side of hill and 22082 from north side. The two exposures are not continuous.
- ✓ 22083  
GTGC  
GTGC
- 1600 N. 75 W. Greenstone conglomerate. Exposure about 150 paces long and very low. The (SW)

country between 22082 & 22083 is low and swampy.

1550 N. 50 W. is a larger exposure of greenstone  
G.C. conglomerate.

G.C. 1620 N. 50 W. greenstone conglomerate again.

✓ 22084 1650 N. 50 W. Exposure about 75 or 100 paces long  
G. (E.W.) of greenstone.

✓ 22085 1715 N. 60 W. Exposure of greenstone schist;  
G.S. extends in a direction nearly NW & SE. and  
dips about vertical. The north side of this

✓ 22086 same hill is found greenstone conglomerate.  
G.S. & G.C.

✓ 22087 1850 N. 250 W. Large exposure of greenstone by  
G.S. side of a wagon road.

Monday, August 24, 1891.

Started at SW corner Sec. 26-48-27 and ran north two miles.

- ✓ 22088  
G.S. 25 N. 2000 W. <sup>Sec 26-48-27</sup> greenstone? Small exposure  
About 12 paces E-W by 8 paces N-S.
- ✓ 22089  
G.S. 100 N. 2000 W. Large exposure of greenstone?  
forming entire hill at this point.
- ✓ 22090  
G.S. 230 N. 2000 W. Small exposure of greenstone.  
15 to 20 paces E-W by 10 to 15 N-S.
- ✓ 22091  
G.S. 290 N. Exposure of greenstone.
- ✓ 22092  
G.S. 440 N. Exposure of finer grained greenstone.

North of this for about 100 paces the country is without exposure. Beyond comes a swamp until 900 N is reached.

- ✓ 22093  
G.S. + G.C. 900 N. on leaving swamp come at once to a large exposure of greenstone conglomerate. The same conglomerate is also found on the next hill to the north - probably 100 paces.

✓ 22094 1120 N. 2000 W. Greenstone conglomerate.  
G.S + G.C.

✓ 22095 1300 N. North side of large exposure of  
G. + G.C. greenstone conglomerate.

The country beyond is low and without exposure. At 1450 N came to swamp 50 paces across. After the swamp the country is again low.

✓ 22096 1940 N. 2000 W. Greenstone occupying hill.  
G.S

✓ 22097 While Oley was looking for corner, I went about  
G.S + G.C. 200 paces east of this point to a greenstone conglomerate bluff. Between 22096 & 97 the land is without exposure.

✓ G.C. 150 N. 0 W. Sec. 23-48-27 is a very small exposure of greenstone conglomerate.

This is followed by low country again; then at 270 N came to swamp which continues to 790 N. <sup>2000 W. Came to</sup> ~~Crossed~~ the Camp at 300 N. <sup>2000</sup> ~~4825~~ W.  
But crossed at 250 N 1825

✓ 22098 840 N. 2000 W. Greenstone conglomerate?  
G.S + G.C.

- 286
- ✓ 22099  
G. II. 1000 N. 125 W. Sec. 22-48-27 is a small exposure of peridotite, near west end of drift covered Hill.
- ✓ 22100  
G. 1120 N. 0 W. Sec 23-48-27 a fine grained greenstone.
- ✓ 22101  
G. S. 1320 N. is a small exposure of greenstone.
- Greenstones in small exposures are also at 1420 N and at 1480 N.
- ✓ G.
- ✓ 22102  
G. S. 1500 N. Small exposure of schistose greenstone.
- From here to the corner the country is without exposure. Continued north in <sup>Sec</sup> 14 to quartzite then returned to corner.
- ✓ 22103  
G. W. 60 N. 200 W. Sec 14-48-27. Graywacke-slate
- ✓ 22104  
I. C. 100 N. is a test pit. Specimen was taken from dump pile and represents the rock that can be seen in the pit.
- ✓ 22105  
G. W. 170 N. 0 W. Sec. 14-48-27. Specimen of quartzite and slate. 22107 Quartzite adjacent
- ✓ 22107  
G. W.

to 22105.

- ✓ 22106 250 N. Slate, small exposure. This is the  
S first rock seen north of the quartzite.

From N.W. corner Sec. 23 ran east 1000  
paces. Not an exposure was seen in  
going to the 1/4 post. at 1000 W. 2000 N. ran  
south two miles.

- ✓ 22108 Just south of 1/4 post is an almost covered  
G S R G C exposure of greenstone conglomerate.

- ✓ G 1800 N. 1000 W. small exposure of greenstone.  
G 1630 N 1000 W. is another small exposure of greenstones

- ✓ 22109 1280 N. Exposure of echinostose greenstone.  
R. S. The country from 1630 N. to 1280 N. is either  
low or swampy.

- ✓ G 1230 N. Small exposure of greenstone.  
G 1215 N Small exposure of greenstone.  
G 1170 N. A little larger exposure of greenstone.  
G 1155 N. 970 W Greenstone.  
G 1100 N. 1000 W Greenstone.



all the above are small outcrops on hills that are drift covered.

- ✓ 22110 1075 N. Greenstone schist.  
 ✓ G.S.
- ✓ G.S. 1000 N. 1000 W. is another outcrop of schistose greenstone. The exposure is continuous for about 75 paces south.
- ✓ 22111 930 N. Still another greenstone exposure.  
 ✓ G.
- ✓ G. 660 N. Another greenstone exposure.
- 300 N. come to swamp bordering the Camp and at 200 N. is the Camp.
- ✓ 22112 1270 N. 1000 W. Sec. 26-48-27 is a large exposure of greenstone.  
 ✓ G.S.
- ✓ 22113 1100 N 1000 W. Large exposure of greenstone conglomerate. The north face is about 40 feet perpendicular.  
 ✓ G. S.T  
 ✓ G.C.
- ✓ G.C. at 975 N is greenstone conglomerate. This rock is continuous from 1100 N.
- ✓ G.C. 890 N also greenstone conglomerate

22114 810 N is a coarse grained greenstone.  
G.S. This exposure continues to about 710 N.  
Specimen was taken at 770 N.

22115 680 N. Greenstone conglomerate in large  
G.C. exposure.

At 600 N. stopped work. Too dark to take  
sights.

Tuesday, Aug 25, 1891.

Started at point left off yesterday and  
ran south to Teal Lake.

G.C. 350 N is greenstone conglomerate. From  
last exposure to this point is swamp.

22116 250 N. is greenstone conglomerate. This is  
G.C. the same hill as 350 N. and extends to 175 N.

22117 a few paces north of the quarter post  
G. is a small exposure of coarse grained  
greenstone. This exposure extends to 1880 N.  
1000 W. Sec. 35-48-27.

✓  
22/18  
G.S

1550 N. 1000 W. Schistose greenstone? Exposure about 100 paces long (E-W). Strike  $W 5^{\circ} N$ , dip  $85^{\circ} S$ . The country until this exposure is found is first low and swampy, then gently rising hills without exposure.

✓ 22/19  
S  
22/20  
S

1400 N. is an exposure of ~~schistose greenstone~~ <sup>slate</sup>, 22/20 being a more darker phase. The latter strikes  $W 5^{\circ} N$ , dip vertical as near as could be determined. Beyond (i.e. south) of this hill is Seal Lake.

at 1400 N. 1000 W. went west 250 paces, and then north to north line of Sec. 35-48-27.

✓ S. Slate was found on the way west to 1150. <sup>Here on top of the hill the slate and 1400 N. greenstone are in contact. No specimen was taken as the rock would splinter and fly apart.</sup>

The lake was about 100 paces south of where we turned N. at 1250 W.

✓  
22/21  
G.S

1370 N. 1250 W. Schistose greenstone. Strike E-W; dip about vertical.

✓  
22/22  
G.S

1446 N. ~~1250 W.~~ and just west of the line is an exposure of schistose greenstone.

✓ 22123 1500 N. 1250 W. Schistose greenstone outcrop, extending E-W just east of our line, and dipping about vertical.  
G.S

✓ 22124 1560 N. Greenstone conglomerate. The south side of the exposure is cut by a quartz vein.  
G.S  
G.C.

✓ 22125 1680 N. Exposure of greenstone schist  
G.S

Beyond this the country is without exposure and swampy until 1910 N. is reached.

✓ 22126 Here is an exposure of coarse-grained greenstone.  
G

At north line of section went west 2.50 paces, then south to Flal Lake.

Coarse-grained greenstone is found on the run west for the entire distance.  
G

✓ 22127 1850 N. 1500 W. Greenstone  
G.S  
1800 N. 1500 W. another exposure of greenstone.  
G.S

✓  
22128  
G.S.

1700 N. 1500 W. Exposure of schistose greenstone with a talcy foot. Strike about E-W; dip about vertical.

✓  
22129  
G.S.  
G.C.

1580 N. 1500 W. Exposure of greenstone conglomerate. Between this place & the exposure north is a swamp.

1525 N. and 1470 N. other exposures of greenstone conglomerate.

✓  
22130  
G.S.  
G.C.

1400 N. 1500 W. Greenstone conglomerate

22131 found just before reaching Teal Lake.  
G.S.  
G.C.

Teal Lake is 1275 N. (estimated).

22131 is between <sup>22130</sup> and the lake and is a small exposure.

From 1400 N 1500 W. went W. 250 paces and then N. to the north line of the section. At point where we turned north Teal Lake is about 175 paces south. On run west passed over greenstone <sup>only</sup> all the way.

✓  
22132  
G.S.

1360 N. 1750 W. Exposure of schistose greenstone.

✓  
22133  
G.S.T.C.

1500 N. 1750 is a very small exposure of greenstone conglomerate nearly covered by moss.

Then comes a narrow swamp.

✓  
22134  
G.S.T.C.

1775 N. a large exposure of greenstone. This exposure is about 200 paces N.E. & W and extends to 1900 N.

✓  
22135  
a

after crossing another small swamp, at 2000 N. came to an exposure of coarse grained greenstone.

at this place turned west 500 paces

✓  
22136  
G.S.

2000 N. 60 W. Sec 34-48-27 is an exposure of schistose greenstone. This runs along the north line of the section for some distance.

at 2000 N. 250 W. Sec 34-48-27 ran south 1/2 mile.

✓  
22137  
G.S.T.C.

1750 N. 400 W. is a very large bluff of greenstone conglomerate. On north side 40 feet perpendicular

- ✓  
✓ 22138 G.S. 1775 N. 250 W. Small exposure of greenstone.
- ✓  
✓ 22139 G.S. 1690 N. 250 W. Large exposure of schistose greenstone, increasing rapidly in width on going west; trending SW-NE.
- ✓  
✓ 22140 G.S. 1650 N. Greenstone.
- ✓  
✓ 22141 G.S. 1575 N. Large exposure of schistose greenstone extending east and west.

Then comes a narrow swamp.

- ✓  
✓ 22142 G.S. 1375 N. Exposure of schistose greenstone.
- ✓ 22143 G.S.F. 1250 N is an exposure of greenstone or graywacke.
- ✓ 22144 G.S. 1150 N. Quartzite. The country between this exposure and the one north is without exposure.

Wednesday, August 26, 1891.

Began at N<sup>1</sup>/<sub>4</sub> post Sec 35-48-27. Ran east 250 paces, then south to Teal Lake.

after leaving the hill from which 22117 was taken the country was without exposure for the 250 paces east.

✓ 22145  
G. 1910 N. 750 W. is an isolated exposure of greenstone, 20 or 30 feet high and extending for 50 or 60 paces to the south.

✓ 22146  
G. S. 1710 N. is an exposure of greenstone. The country before exposure is reached is low and swampy.

✓ 22147  
G. S. 1560 N. Greenstone.

At 1400 N. is Teal Lake (estimated)

At 1500 N. turned east 300 paces.

✓ 22148  
G. S. 1475 N. 500 W. is greenstone. Eastern end of hill. This rock is found all the way from point where we turned east to this point.



- ✓  
 ✓ 22149 G.S. 1600 N. 450 W. Fine grained greenstone.
- ✓ 22150 G.S. 1690 N. 430 W. Small exposure of a schistose rock that is quite rotten. Strike W. 5° N. dip about vertical.
- ✓ 22151 G. 1780 N. 430 W. Small exposure of coarse greenstone. The same rock is ~~in~~ seen in larger exposure a short distance to the east and across a small creek.
- ✓ G. 1940 N 430 W. Greenstone.  
 at N. line went east 180 paces and then south to lake again. From 430 W to 250 W 2000 N. the rock like 22151 was seen.
- ✓ G. 1870 N. 250 W. Farther east on same hill as 22151. Same rock as 51.
- ✓ 22152 G.S. 1720 N. 250 W. Small exposure of fine-grained greenstone.
- ✓ 22153 G.S. 1580 N. Schistose greenstone.
- ✓ 22154 G.S. 1500 N. Schistose greenstone  
 Teal Lake is about 75 paces S.

West E. 250 paces and then north  
to north line of section.

✓  
22155  
G.C. 1570 N. 180 W. Greenstone conglomerate.

1620 N. 30 W. Sec 35-48-27 in Teal Lake.

✓  
22156  
G 1740 N. 0 W. A Long (E-W) exposure of  
greenstone.

✓  
22157  
G 1875 N is another <sup>small</sup> exposure of greenstone.  
Specimen was taken at 1900 N.

40

Camp near Powder Mills, <sup>South</sup> E. of Ishpeming.  
Monday, August 31, 1891.

I started at SW. corner Sec 12-47-27  
ran East 250 paces, then N.  $\frac{1}{2}$  mile.

✓ 22158 G 0 N., 1980 W. Small exposure of greenstone

✓ G. Small exposure of greenstone also at  
15 N. 1840 W.

✓ G. 0 N. 1750 W. small greenstone exposure. The  
above three are all small, being low and  
nearly covered with moss and drift.

✓ 22159 G 100 N. 1750 W. Large exposure of greenstone.  
This can be traced to the west for about  
100 paces.

✓ G. 190 N. 1750 W. Another exposure of greenstone

✓ 22160 G 490 N. 1750 W. Large exposure of graywacke.

✓ 22161 G. P. 630 N. 1750 W. exposure of epidote rock.  
Exposure is small and drift covered and  
where specimen was taken is about 6 feet  
high.

✓ 22162 650 N. 1750 W. Schistose greenstone from a  
G.S. test pit. Very small exposure

✓ 22163 780 N. 1750 W. Lean ore from a very large  
SP. test pit. Strike 30 N of W. dip 45° S.

820 N is wagon road to Winthrop mine from  
Schpening

at <sup>ex W 1/4</sup> ~~north~~ line of section ran east 200 paces

✓ 22164 850 N. 1650 W. Small exposure of lean ore  
R.I? Strike W 25° N. dip 32° S.

✓ 22165 900 N. 1500 W. Very large and high bluff of  
coarse greenstone.

675 N. 1500 Branch of wagon road to Winthrop  
mine.

✓ 22166 550 N. 1500 W. Large exposure of greenstone  
coarse, extending across our line for a  
considerable distance.

all the rest of the way to the south  
line the country is very bushy and drift

covered. Not an exposure was seen.

At south line ran east 250 paces, and then north  $\frac{1}{2}$  mile.

- ✓ 22167  
G 1975 N. 1400 W. Sec 13-47-27 is a small low knob of coarse greenstone or diorite.
- ✓ 22168  
G 70 N. 1250 W Sec 12-47-27 Another exposure of coarse greenstone or diorite. This may be seen for some distance extending across our line.
- ✓ 22169  
G 225 N. Another exposure of coarse greenstone.
- ✓ 22170  
G 530 N. Coarse greenstone.
- 600 N. is a branch ~~road~~ of the Winthrop Mine road.
- No other exposure was seen until 950 N. 1250 W. is reached. A very large exposure of arenaceous slate, extending about 100 paces west of our line, and toward the east beyond the 1000 W, where we turned south. Strike  $W 20^{\circ} N$ ; dip  $50^{\circ} S$ .
- ✓ 22171  
I. A.

At 1000 N 1250 W turned east 250 paces.  
and then ran south to the south line  
of the section.

South of the exposure from which 22171  
is taken is a swamp about 100 paces  
across.

✓ 22172 400 N. 1000 W. Coarse greenstone or  
G diorite. Same rock also at 375 N.

✓ 22173 190 N. 1000 W. Small exposure of greenstone  
a like 22172.

The greenstone exposures in this section  
differ from those north of Teal Lake by  
being smaller, and the hills bushy so  
that it is difficult to work far away  
from the line. All the country worked  
from this camp is covered with dense  
bushes.

✓ G. 150 N. Another small exposure of greenstone.

Tuesday, September 1st, 1891.

Started at N  $\frac{1}{4}$  Sec 13-47-27 and ran south to the railroad.

- 22174 1640 N. 1000 W. Small exposure of diorite  
 G about 100 feet E-W and about 10 feet wide.
- 22175 1590 N. 960 W. another exposure of this same  
 G diorite.
- 22176 1460 N. 1000 W. Diorite. South of this  
 G exposure is a swamp.
- 22177 1300 N. on leaving swamp came to exposure  
 G of greenstone or diorite
- 22177 1175 N Low, small exposure of greenstone.  
 G

From this point to the C & N W Ry. track (Iron Cliffs branch) at 1480 N. 1000 W. Sec. 24-47-27 not an exposure was seen. Country in places low and swampy and hills covered.

At railroad turned east 500 paces, then north to the north line of Sec 13-47-27.

Railroad is at 1640 N. 500 W. where we started north.

No exposure were seen in going north until 650 N. 560 W. Sec 13-47-27 is reached. The country is of the same character as on the run south.

- ✓ 22178 I. A. 650 N. 560 W. is a large exposure of slate. Strike and dip could not be determined.

There is a swamp on both N and S. side of this exposure.

- ✓ 22179 S. F. 990 N. 500 W. Large exposure of slate. Strike W.  $20^{\circ}$  N. dip  $70^{\circ}$  N.

- ✓ 22180 G. 1130 N. 500 W. the next hill to the north is greenstone <sup>and diorite</sup>. Greenstone is also found at 1250, 1320, and 1350 N. in small exposures.

- ✓ 22181 G. A larger exposure of greenstone occurs at 9440 N. The north side of this hill is 1590 N. & the rock is also exposed here as well as at intervals between this point and 1440 N.



✓ 22182  
G 1670 N is another exposure of greenstone.

✓ 22183  
I. A Beyond 22182 the country is without exposure until 1920 N 460 W is reached. Here is found slate, which extends to the section line. Strike and dip were taken at 2000 N. 500 W. S. N. 25 W? dip 25 S?

From north line of section ran north  $\frac{1}{2}$  mile in Sec 12-47-27.

✓ 22184 I. A  
✓ 22185 G. S  
✓ 22186 ~~G. S~~  
350 N is a long ridge of greenstone, on the south side of which is slate. 22184, slate 22185 greenstone, 22186, was taken to show the contact of the two. At the point of contact the slate is very thin but thickens rapidly on descending the hill.

✓ 22187  
I. A, 525 N 500 W. Sec 12-47-27 <sup>slate from</sup> ~~at~~ (north side of hill from which 22184-86 were taken. The exposure is small but I think is in place. Strike W. 25 N. dip 50 S.

✓ 22188  
G 650 N. 500 W. Exposure of diorite or greenstone fine-grained.  
G 700 N. is also an exposure of greenstone.

- ✓ 22189 I.A.  
 ✓ 22190 G.  
 800 N. 500 W. exposure of greenstone, on the south side of which is slate (22189). The contact is covered. Could not get strike and dip.

920 N. a small exposure of fine grained greenstone.

- ✓ 22191 G.  
 1000 N. Coarse grained greenstone or diorite

Wednesday, September 2, 1891.

Started 1000 N. 1750 W. Sec 12-47-27 and ran north to north line of section.

- ✓ 22192 G.  
 1160 N. 1750 W. is the first exposure <sup>rock</sup> with; coarse grained greenstone, <sup>or diorite</sup> extending NW-SE across our line.

1275 N. is Sulphur-Whitkop mine road.

- ✓ 22193 G.  
 1300 N. 1700 W. Diorite like 22192.

1360 N wagon road again.

22194  
Q.

1390 N. Just across bridge on wagon road NE of Powder mills. Small exposure of greenstone.

22195  
I.C.

1550 N and a little east of the line is a small exposure of banded chert and ore very lean. Strike W 20 N. dip 40 S. Test-pitting has been carried on here.

22196  
Q

1600 N 1750 W. A very large and high bluff of coarse greenstone, extending across our line

at 1670 N. 1690 W is swamp which continues to near the north line of the section.

at north line went east 250 paces and then south 1/2 mile. 1584 W 2000 N is swamp.

22197  
Q

2000 N. 1460 W. Small low exposure of greenstone, extending to a short distance beyond the 1500 W.

at foot of this hill enter swamp which continues to 1770 N. 1500 W.

- ✓ 22198  
G. 1610 N. 1560 W. Large exposure of diorite  
or greenstone (coarse)
- ✓ 22199  
I A 1470 N. 1540 W. Slate. Strike and dip  
could not be determined.
- ✓ 22200  
G 1300 N. 1500 W is an exposure of greenstone,  
slightly schistose. At the top the  
greenstone is coarser grained.
- ✓ 22201  
G 1175 N. 1500 W. is a long ridge of coarse  
greenstone.
- ✓ 22202  
I. C 1125 N. 1500 W. is an exposure of ferruginous  
chert. Hill is over 100 feet high and the  
whole south side is exposed. 1100 N bottom  
of hill.
- ✓ 22203  
G 1050 N. 1560 W. coarse greenstone.

Thursday, September 3, 1891.

Started at NE corner Sec 24-47-27, intending to run south to the granite.

v 22204  
F. A.

1900 N. SW. Exposure of ferruginous slate  
Strike and dip could not be determined.

1865 N SW is Iron Cliffs branch of O.R.W.  
Ry. Stopped work here on account of  
rain.

Friday, September 4, 1891.

Began at place left off yesterday and  
continued south to the granite.

After leaving the railroad the country  
is swamp to 1790 N. Then comes a series  
of long, low, rounded hills without exposure.



v 22205  
Gr.

Not a exposure was seen until 675 N.  
1975 W. Sec 30-47-26 was reached. Here is  
a large exposure of granite

At this point went west 1000 paces and then north to the railroad.

✓ Gr. Granite was found at 675 N. 100 W.

✓ 22206  
G.S. 575 N. 550 W. is a small exposure of greenstone.

✓ 22207  
S.C. 750 W. 525 N is another exposure of granite or gneiss

✓ 22208  
S.C. 780 N. 1000 W. Exposure of greenstone?

The above three exposures are small and are on the sides of drift covered hills.

✓ 22209  
G.C. across a valley at head of little lake is a large exposure of schistose greenstone. This is at 1020 N. 1000 W. Sec 25-47-27.

✓ 22210  
G.C. Near the top of the exposure is cut by a granite dike about 4 feet across. About 25 paces farther west the exposure is conglomeratic. The schistose <sup>rock</sup> part is angular and breaks off in tooth-shaped pieces. S. W. 20° N; dip 45° N.

✓ 22210 A  
S.C.

Going  
On way north not an exposure was found  
on way to railroad, which was struck  
at 1480 N. 1000 W. Sec 24-47-27. The  
country is comparatively low and drift  
covered and in places is swampy.

Saturday September 5, 1891.

Started at 1670 N. 500 W. Sec 24-47-27  
and ran south to the granite. The country  
between starting point and railroad to the  
north is swampy.

No exposures were seen on way south  
until 1420 N. 500 W Sec 25-47-27 was reached.  
Here is a test pit in the drift. No rock  
can be seen in place in the pit but 22211  
actinolite-schist was taken from the dump  
pile.

22211  
I.A.

22212  
I.C

1300 N. 560 W. are two more test pits in the  
drift. One of them is boarded up on the  
side, and the other not. Specimen is from  
first pit; lean or. No rock could be seen

in the second pit.

At 500 W 1000 N went west ~~800~~<sup>800</sup> paces and then north to 1700 N ~~1250 W~~. railroad.

- ✓ 22213  
S. Cg. 1000 N. 1300 W. Schistose greenstone from near east end of hill from which 22209 was taken. The A granite dike is also seen at this place.
- ✓ 22214  
Q. 825 N. 1300 W. Sec 24-47-27. Diorite exposure about 40 feet E-W and 15 wide.
- ✓ Q. 900 N. 1300 W. Small exposure of greenstone or diorite.
- ✓ 22215  
Q. 930 N. another exposure of diorite,
- ✓ Q. 1190 N. is a small exposure of diorite. I don't know whether it is in place or not. There are numerous boulders of the rock around here.
- Struck railroad at 1380 N. Road runs nearly NW & SE here.





