Northern Minnesota, August, September, October 1891. No. 130 1891

Merriam, W. N.
[s.l.]: [s.n.], 1891

U. S. GEOLOGICAL SURVEY

FIELD SECTION BOOK

130

Notebook # 130

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 lines 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 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 § 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.

Northern Minnesota

Aug. Sept. & Oct. '91

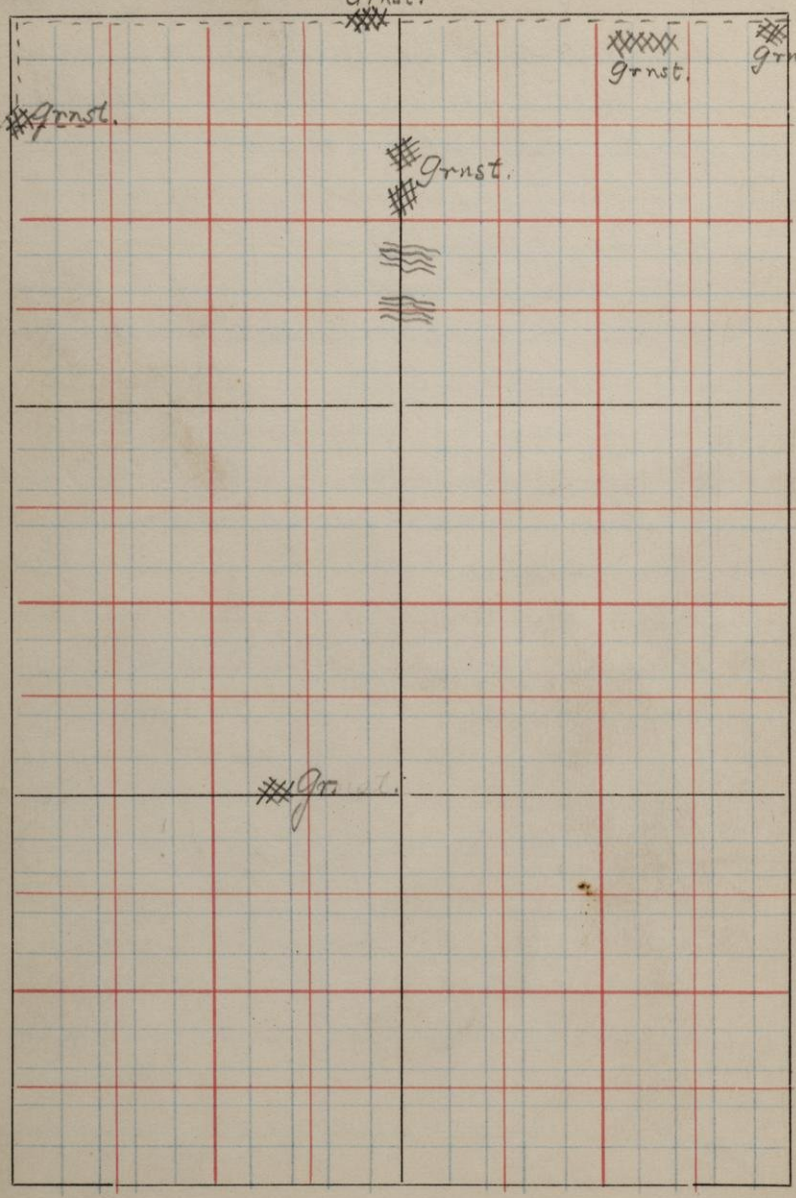
#130

We started from Grand Rapids on the Mississippi Riv. in Sec. 21 T. 55 R. 25 for Bear Lake in 21-60-23.

Taking the canoe trail that starts from Bass Lake in 56-26 we went north through Bass and Deer lakes into Trout lake in 59 & 58-25 W. From the north end of Trout lake a portage of two miles was made to a small lake in Secs 34-35-58-25

From this lake a series of lakes and small streams were passed until reaching Long lake in Secs. 22-16-17-59-24 where the canoes were left and supplies packed to Hatlig lake in the S.W. corner of T. 59 R. 23 (Brice's ranch) A trail leads north from this ranch to Bear Lake No exposures were seen at any point along this route. The surface is rolling sand hills or sand plains

23 T. 60 R. 23



29501 2000 N. 1150 W. S. E. 23-60-23
A large ledge of schist. These rocks are badly folded and are similar to those lying below the iron-bearing rocks on the Vermilion range

29502 2000 N. 1075 W. 23-60-23
Coarse greenstone in contact with 29501. Probably a dike

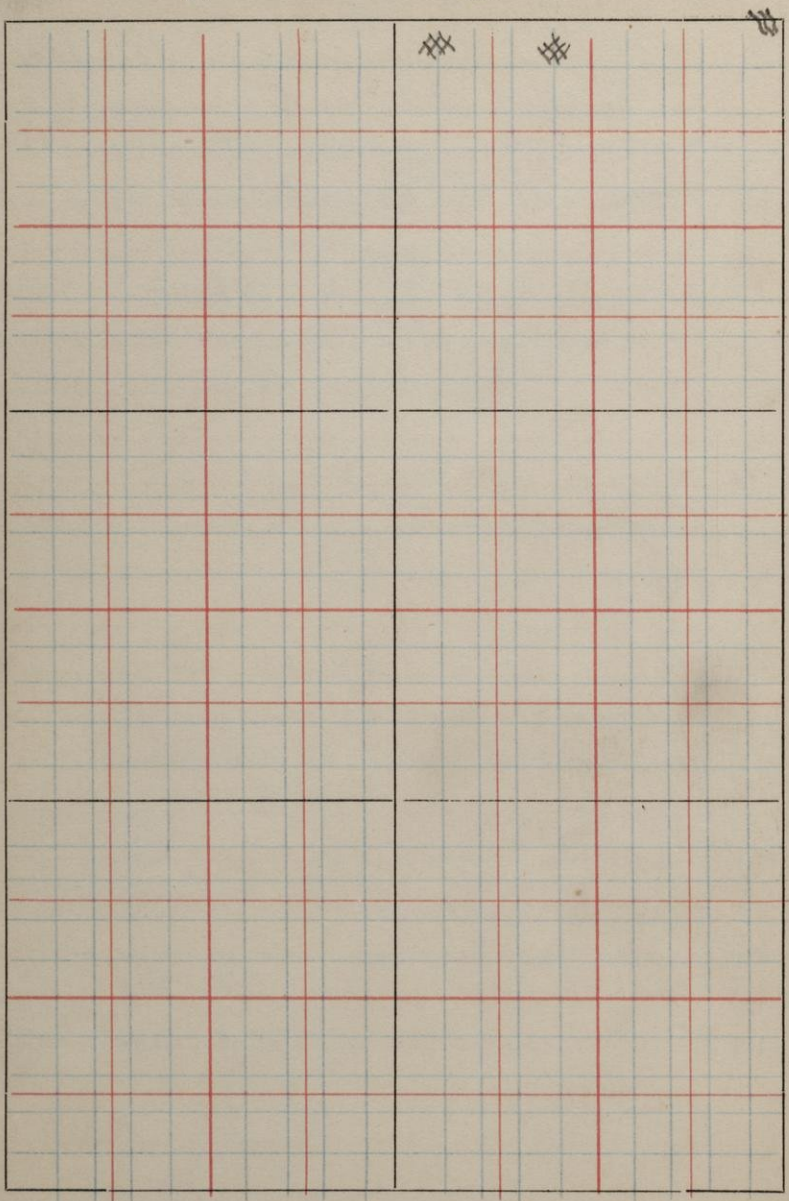
29503 2000 N. 400 W 23-60-23
Coarse greenstone in large exposure running a little S. of W.

29504 1940 N. 00 W. 23-60-23
Coarse greenstone. A large quartz vein noted at this point

29505 1960 N. 800 W. 24-60-23
Small ledge of Hb. schist

29506 1960 N. 650 W. 24-60-23
A coarse Hb. rock garnetiferous in places

24 T. 60 R. 23



29507 2000 N. 50 W. S.E. 24-60-23
Small exposure of garnetiferous
ht. schist- Strike N. 45° E
Dip 80° S.

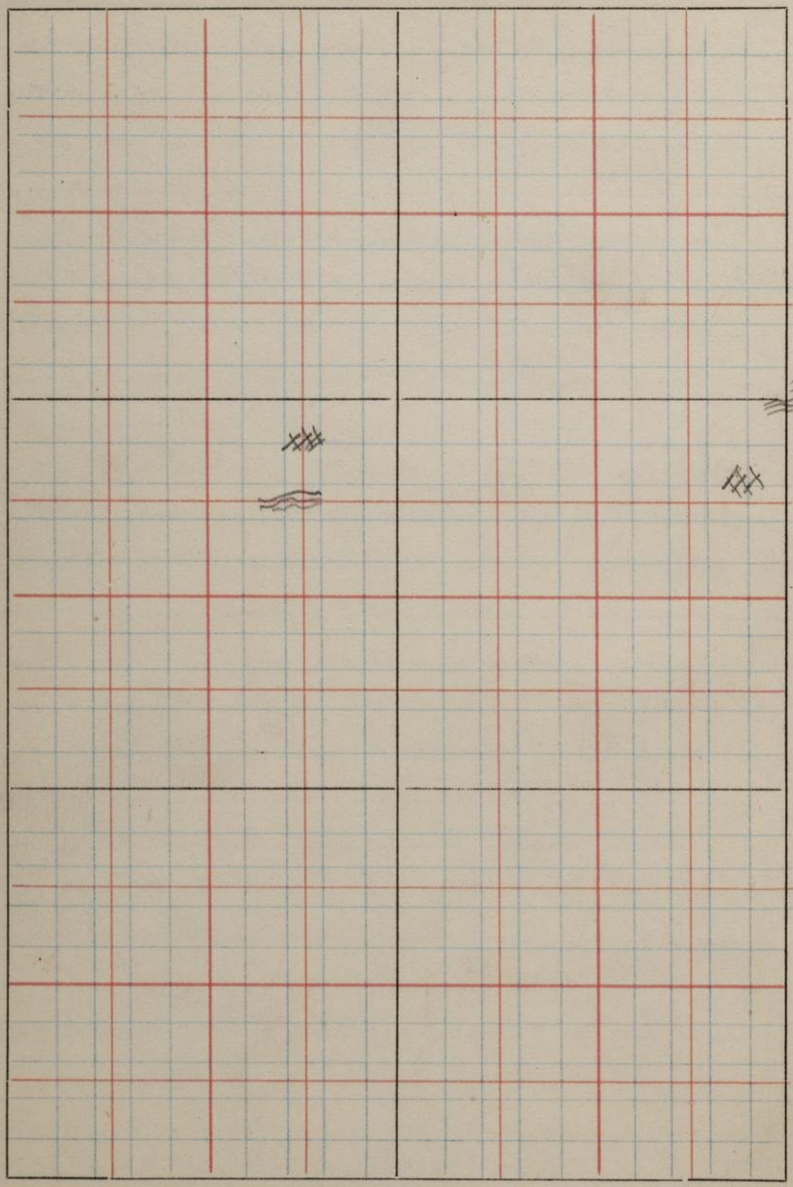
29508 Near the East ¼ post 13-60-23
29509 The chirty and irony material
lies in lenses and irregular bands
in the hornblende schists
Strike S. & W. Dip high.
The magnetic variation is very
strong at this point, but is local
dying out at only a few hundred paces
in all directions

29510 800 N. 100 W. S.E. 13-60-23
Ledge runs about E. & W.

29511 N.E. & S.W. Sec. 13-60-23
29512 Irony phase of the schists. On
one place a red jaspery material
shows over an area of a few sq. ft.
The magnetic attraction is strong
at this point but is local

29513 About 100 steps north of 29511-12

13 T. 60 R. 23

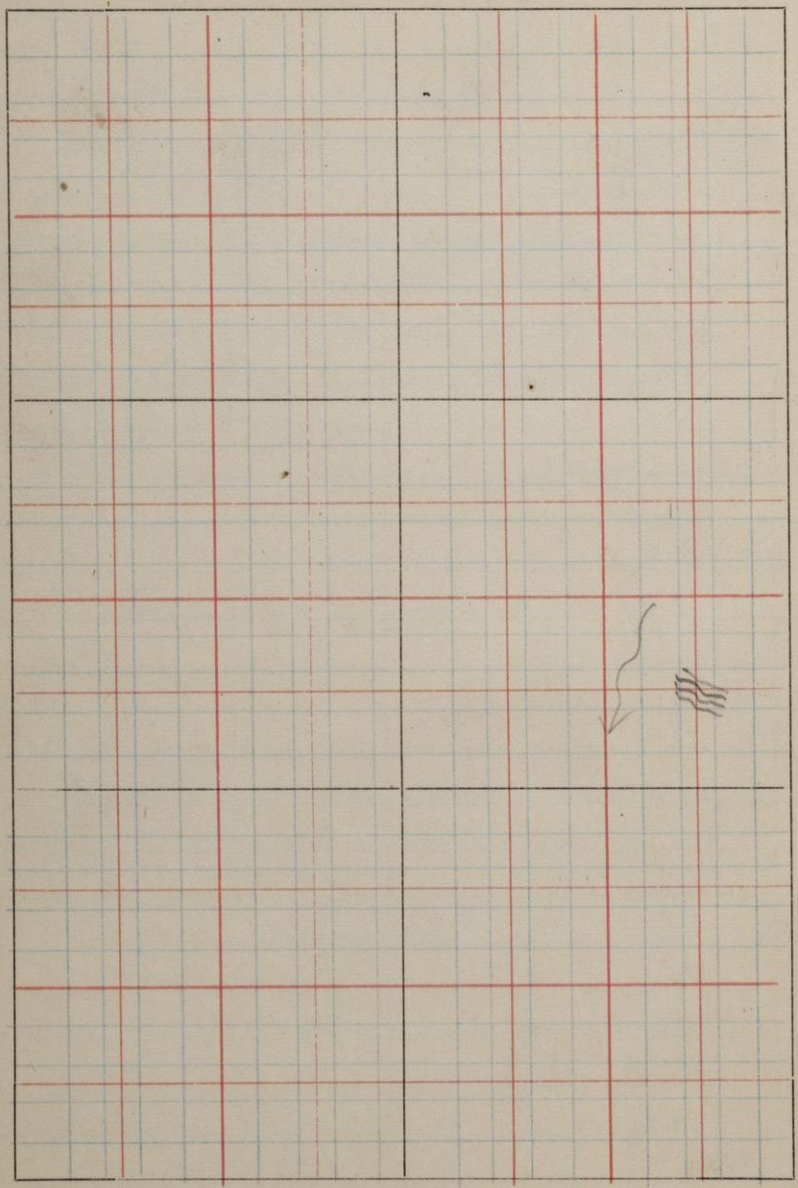


29514 1400 N, 1000 W 23-60-23
29515 At this point a test pit has been
29516 sunk a few feet in a lean magnetic
ore which appears to lie in lenses and
irregular seams in the schist
Both schists and ore are cut
by a series of dikes of at least two
ages one of the dikes being a porphyry
The schists are highly contorted
The attraction is strong here, but
is local

29517 N.E. of S.W. 25-60-23
Aphinitic grained greenstone

29518 Near the center of the S.E. of S.E. 36-60-23
29519 A lean magnetite in a hornblende
29520 schist The ore occurs in lenses
and bands both being cut by small
hornblende granitic veins
The widest ore band is about 5 ft.
the bands being very irregular
Both ore and schist carry garnets
in large quantity
Strike N.W. dip about vertical

36 T. 60 R. 23



29521 2000 N. 1400 W. 26-60-23
Large exposure of homblende schist

29522 70 paces west of 29521 a granitic phase

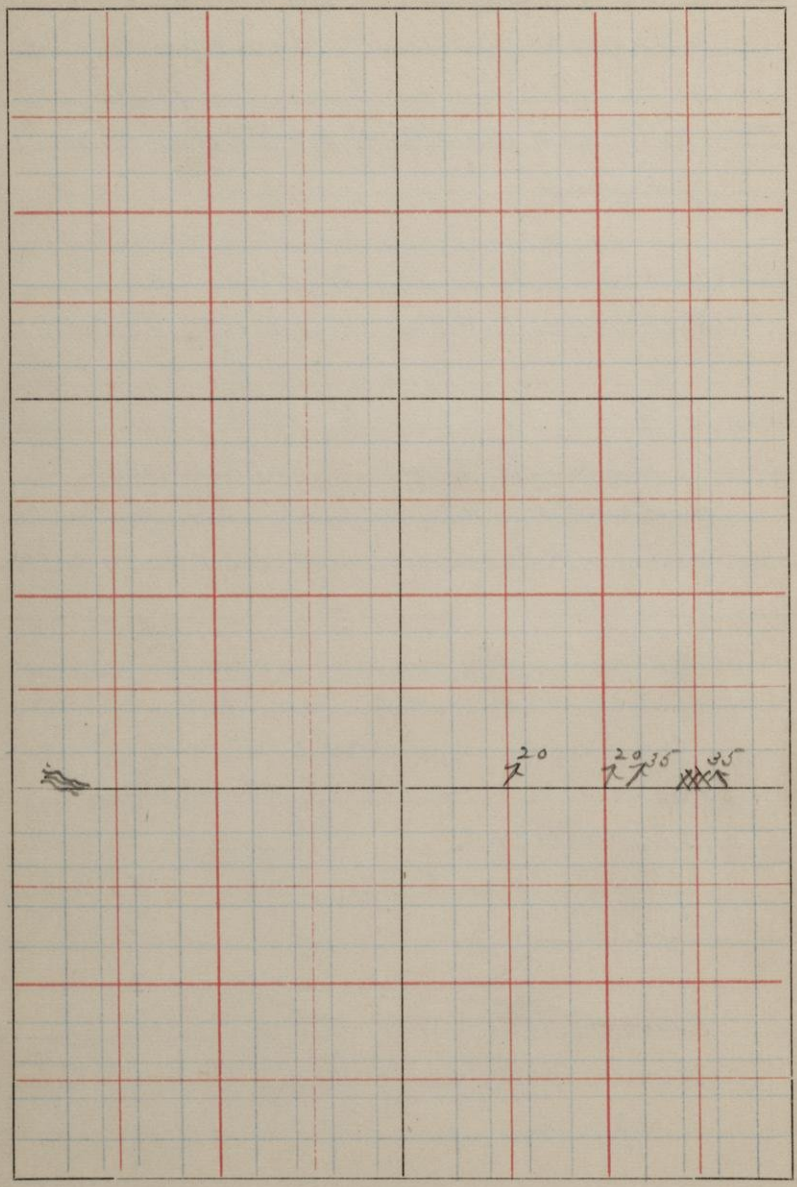
29523 2000 N. 1860 W. 27-60-23
a large ledge running N. & S.

29524 N.E. ¼ N.E. 21-60-23 East side
29525 of Bear lake. The rock is mainly of the schist, the granitic material occurring in veins and patches.

29561 S.E. of S.W. 33-60-23
a homblende schist in large exposure Strike slightly N. of W. Dip vertical The schist is cut by a large dike over 100 ft. wide

1040 N. 1980 E. 18-60-22
Small ledge of fine grained eruptive

22 T. 60 R. 23



1840 N. 00 W. 22-60-23
A large exposure of schist, the rock at the south side of the exposure has almost a fragmental appearance

3000 N. 00 W. 22-60-23
A low ledge of hornblende schist very like that along the Vermilion range

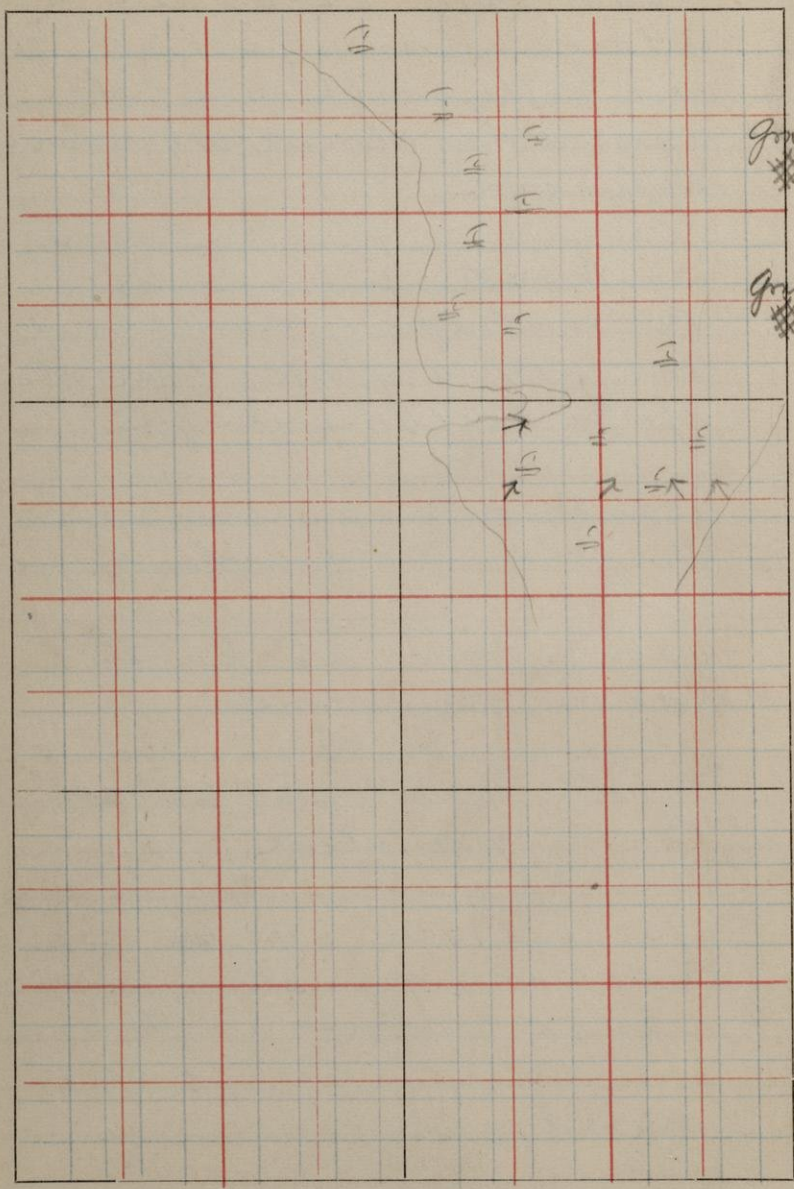
1320 N. 00 W. 23-60-23
Very close to a hornblende granite

1260 N. 00 W 26-60-23
Coarse greenstone

1670 N. 00 W 26-60-23
Coarse greenstone

1750 N. 875 W. 14-60-23
A schistose greenstone in quite a large exposure. The schistose structure runs east and west. Dip 80° S.

26 T. 60 R. 23



1450 N. 1250 W 10-60-23
Coarse grenstone

800 N. 500 W. 10-60-23
Fine grained grenstone

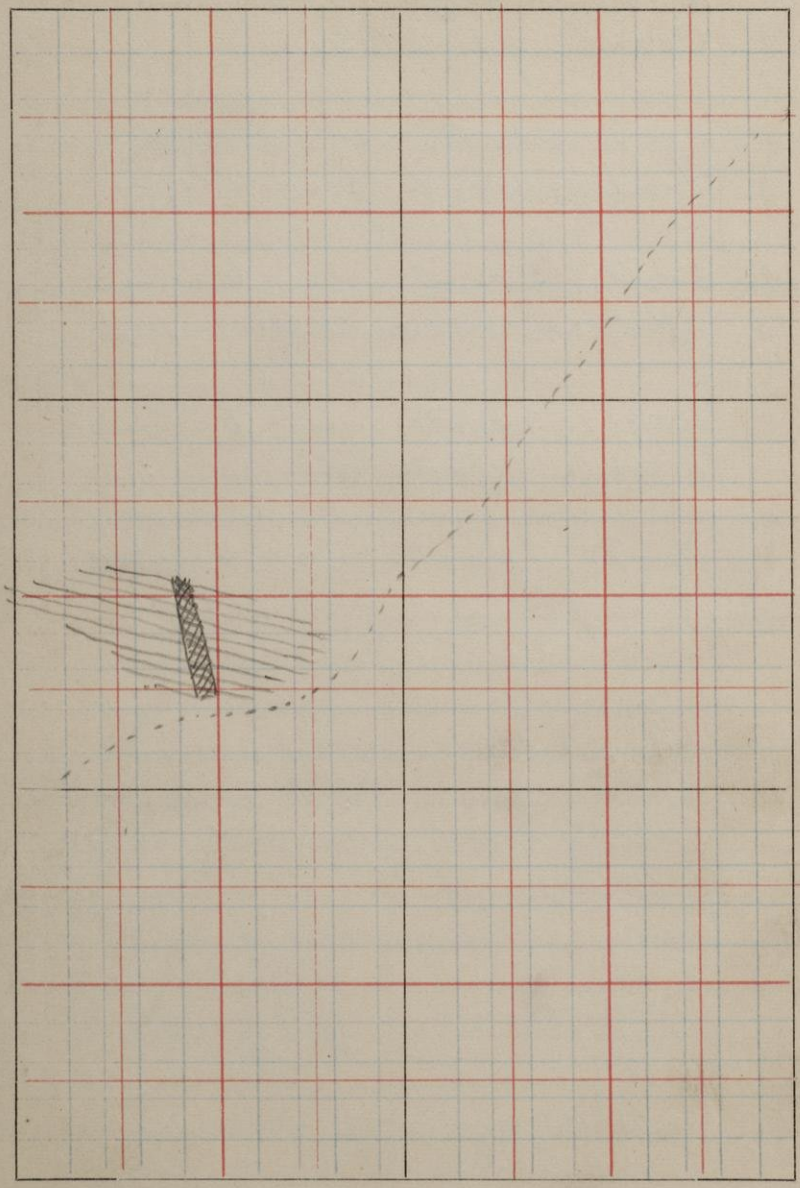
300 N. 900 W. 10-60-23
Coarse grenstone

1100 N. 1000 E. 10-60-23
Coarse grenstone

920 N. 1000 E 10-60-23
Fine grained grenstone

The rocks occurring in T. 60 R. 23 are a series of hornblende schists cut by large dikes and masses of grenstone of two or three different ages The formation as a whole is very similar to that lying below the iron bearing formation at Vermilion The iron in the schists is local and in small lenses or bands and is highly magnetic In two localities

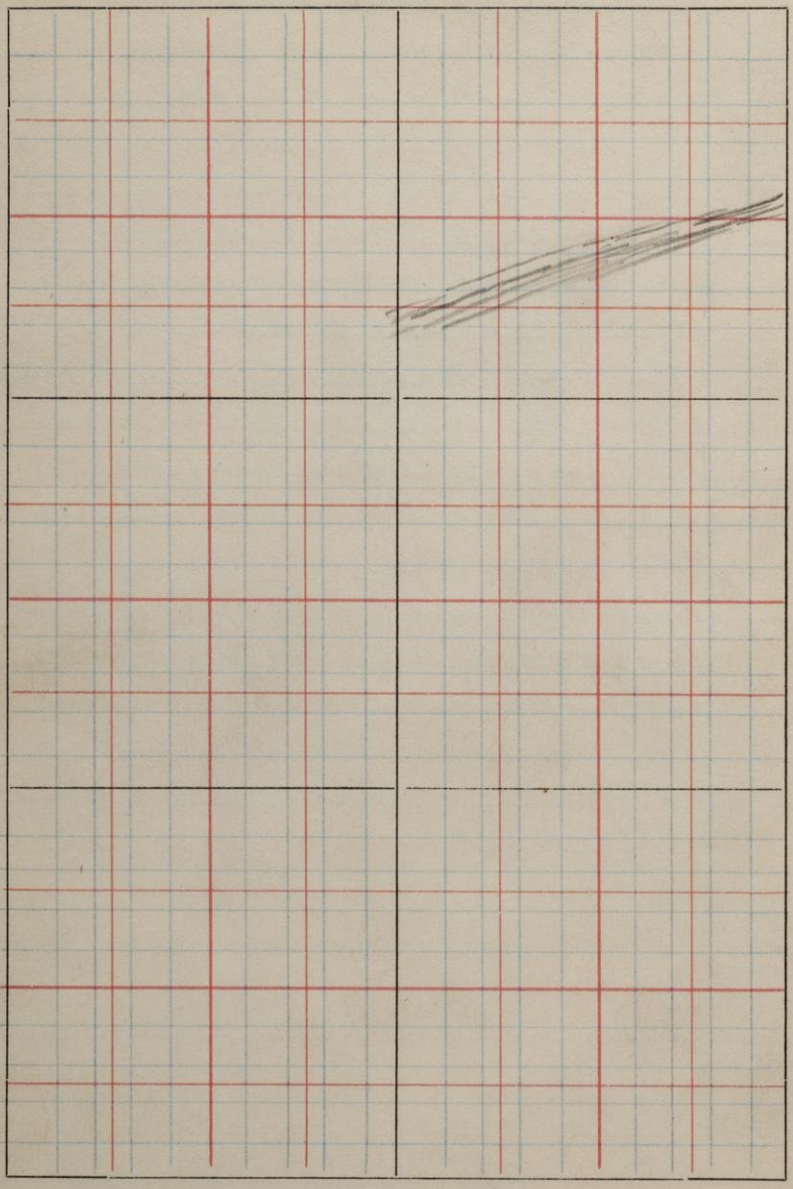
33 T. 60 R. 23



a granitic rock was seen possibly a vening from the granites to the South

In Sec 2 T. 60 R. 24, a large range of lean iony quartzite occurs running a little N.E & S.W. The magnetic attraction is strong along this belt. The rock here is unlike anything seen in T. 60 R. 23. In places the rock has been broken and has a brecciated appearance; it is very similar to quartzites seen on the shores of Vermilion Lake just north of the mines. The quartz occurs in both the saccharoidal and chalcedonic forms

2 T. 60 R. 24



No exposures except those mentioned were found in this section though the following routes were followed and down examined

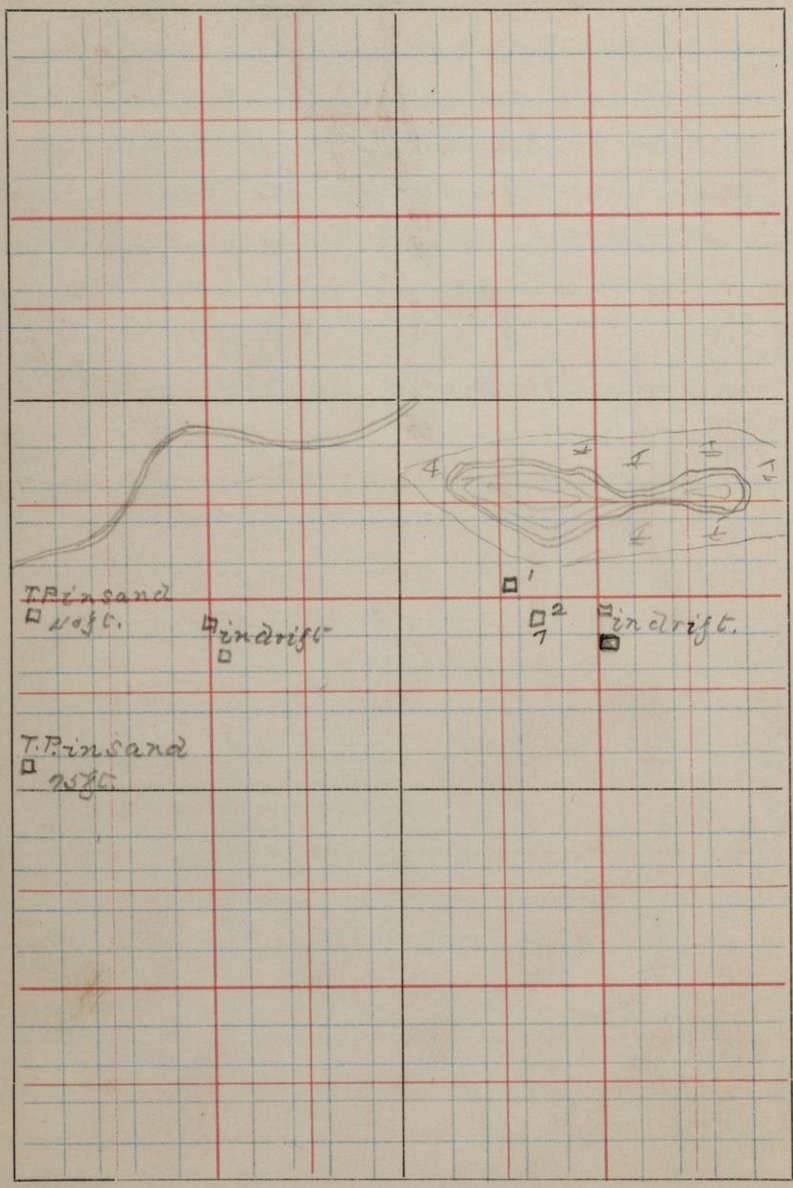
From Hartley lake in 59-23 down the Prairie river to Prairie lake. From Gd. Rapids to Long lake by way of Habano lake and found the S.E. corner of 60-24 through the canoe route through the north side of 59-25-26-27 into Turtle lake in 59-60 Rs 26-27 Then down Turtle river to Bowstring lake from Bowstring to Winnibigoshish, then down the Mississippi to Grand Rapids

No exposures were seen except at Pokegama falls on the Mississippi where a red vitreous quartzite is to be seen

Besides these routes Towns 59-23&24, The S. western part of T. 59-22, the N. western part of 58-22, the S. west of 60-24 and the S. East of 60-25 were

examined without result.
The surface of the whole region is level to slightly rolling land, with the exception of a few moraimic hills in several localities

35 T. 56 R. 25



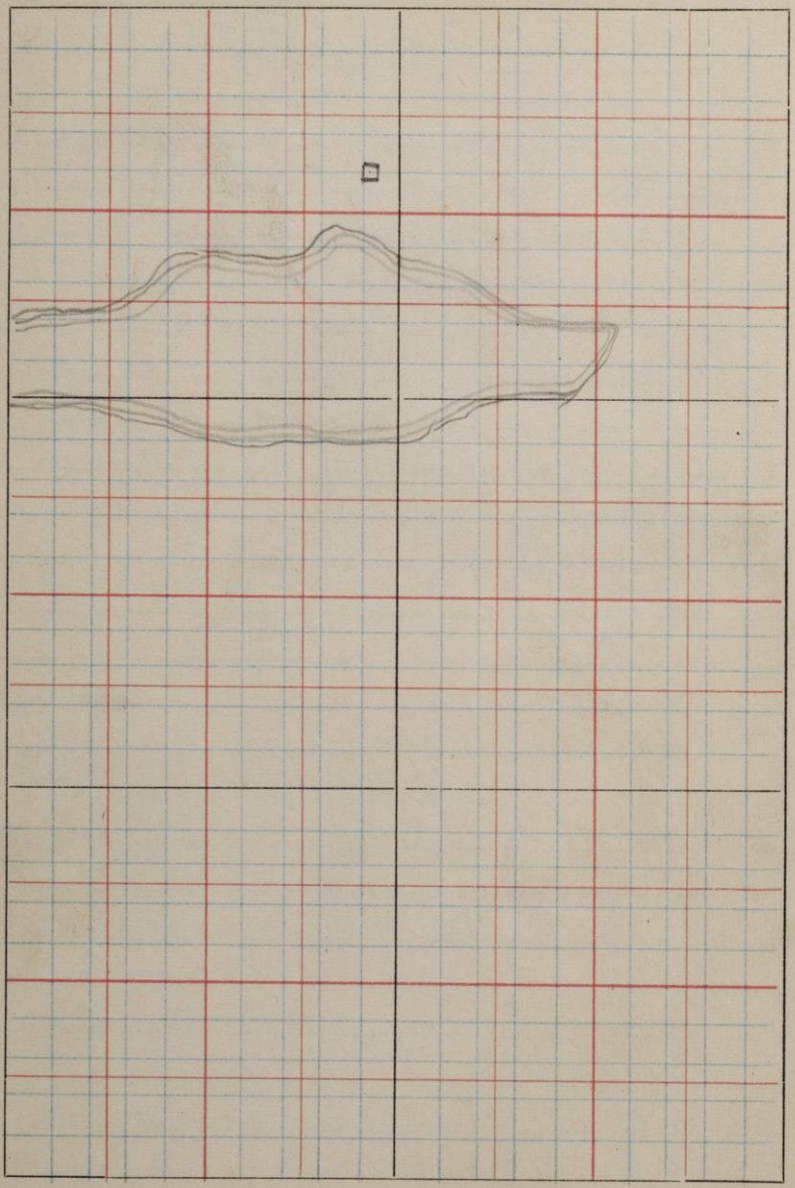
Misabi Range from Prairie River to Misabi Sta.

At the Prairie river falls in the S.E. of 34-56-25 the granite is exposed with a red flat-lying quartzite lying just above it. The lower layers of this quartzite are in places almost conglomeratic; from this they pass up into a finer quartzite which becomes more and more ferruginous until the uppermost layers exposed in this section are a banded jasper and iron ore. The dip is about 4° to the S.

Going east from this point no natural exposures of quartzite are seen for several miles.

In the S.E. of 35-56-25 two test pits (1 and 2 on map) have been sunk in drift 40 or 50 feet and bottomed in the ferruginous quartzite similar to that at Prairie river.

36 T. 56 R. 25



In the N.E of the N.W of 36-56-25 a shaft has been sunk by the Buckeye people and bottomed in the lean ore

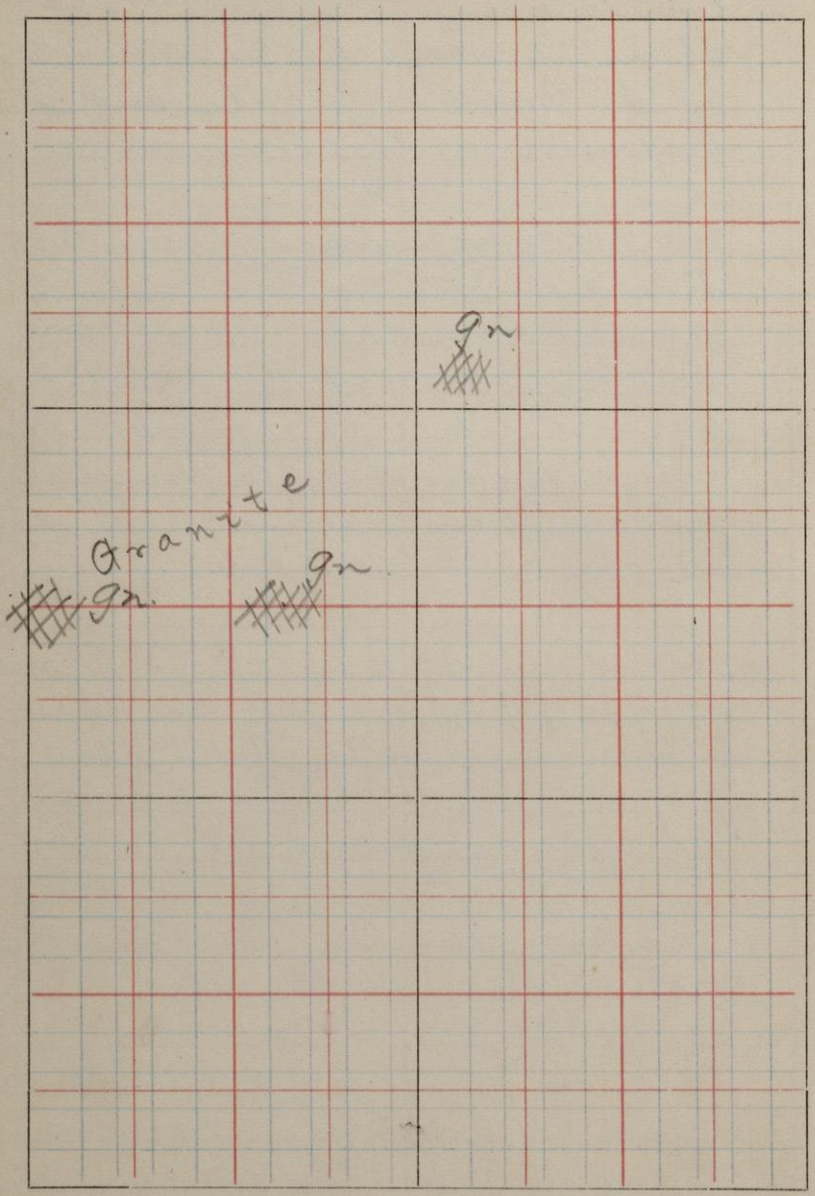
No more exposures or shafts are to be seen for several miles east or until near the N.E corner of sec. 20. 56-24 where there are two test pits both bottomed in a ferruginous quartzite similar to those already seen. The shafts are about 50 or 60 ft deep

In the N.W of N.E, N.E of N.E and S.W of N.E of 21-56-24 are three shafts sunk by the North Star people and bottomed in the ferruginous quartzite

The Diamond Co. have sunk several shafts in the S.E of S.W of 15-46-24 in a loose brown lean ore It is of a better grade than at any other place on the west end of the range (about 5-0% iron)

56-24

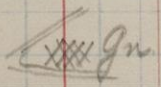
26 T. 56 R. 20



In the S. E. ¼ S.W. 14-56-24 are two shafts one in drift and the other bottomed in the ferruginous quartzite

29526 Near the center of 13-56-24
Red quartzite striking about E.P.W.
Dip south about 8°

19 T. 56 R. 24



17 T. 56 R. 24

9n.

9n.

29527 645 N. 430 W. 17-S6-24
Red granite in low exposure

9 T. 56 R. 24

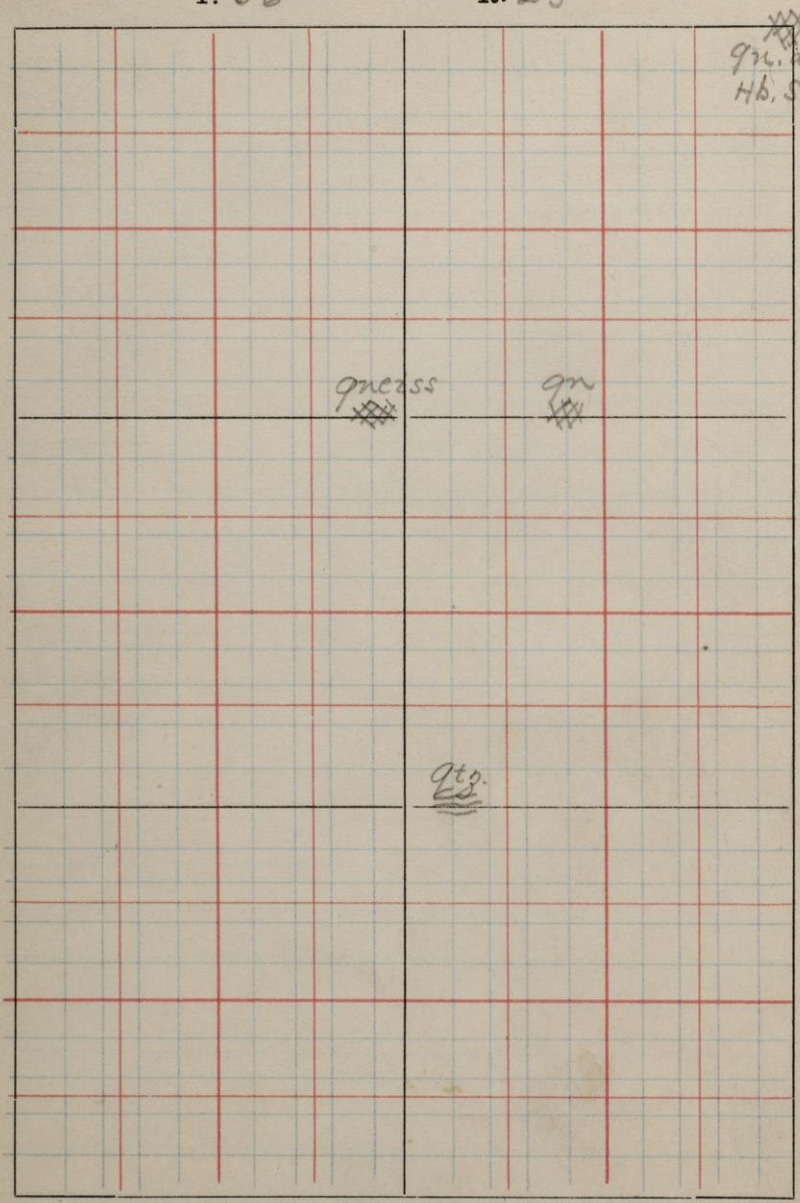
9n.

9n

29528 900 N. 2000 W. 9-56-24
Granite

29529 2000 N. 1400 W. 9-56-24
Granite

3 T. 56 R. 23



29530 1000 N. 1100 W. S.E. 3-56-23
Grey granite or gneiss

29531 950 W. 00 N. 3-56-23
Red quartzite

29532 1000 N. 600 W. 3-56-23
Granite

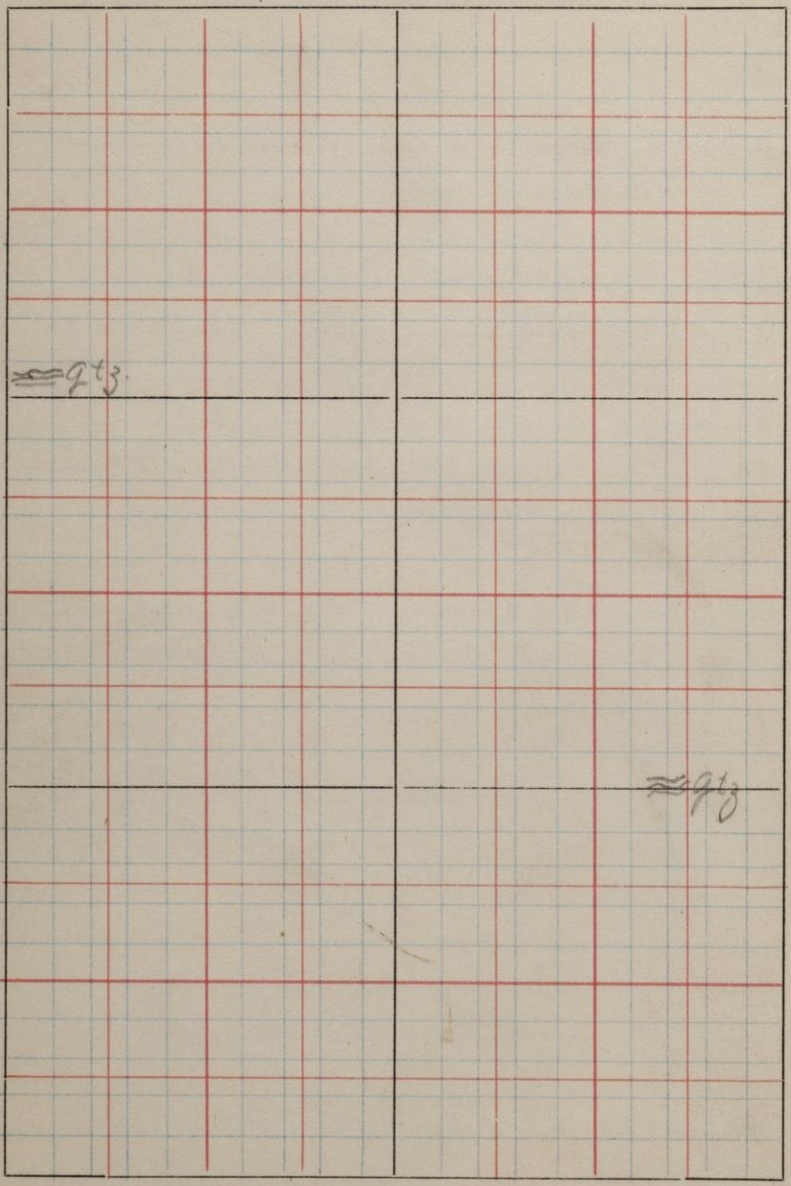
29533 2000 N. 00 W. 3-56-23
Hornblende gneiss with granite veins or layers

29534 Same locality as 29533
29535 showing different phases of the rock

29536 From the dump piles at the
29537 North Star shafts near the center of Sec. 17-58-19

— Granite is exposed in section 8 58-19 near the W. ¼ post

29538 } See p 30 & also p 18
29539 }

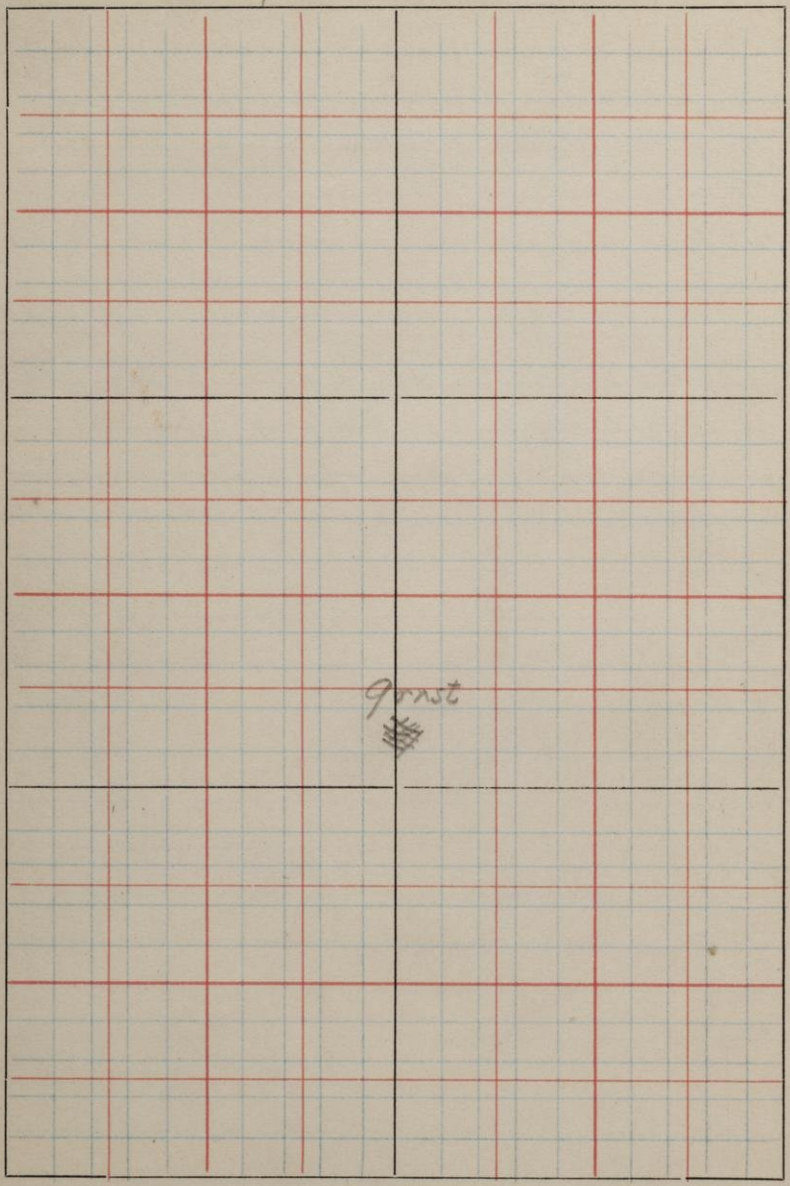

≈ qtz.
≈ qtz

29540 500 N. 2000 W. 30-09-17

29541
42
(lost) 43
44
2000 N. 00 W. 31-09-17
See map & note p 31

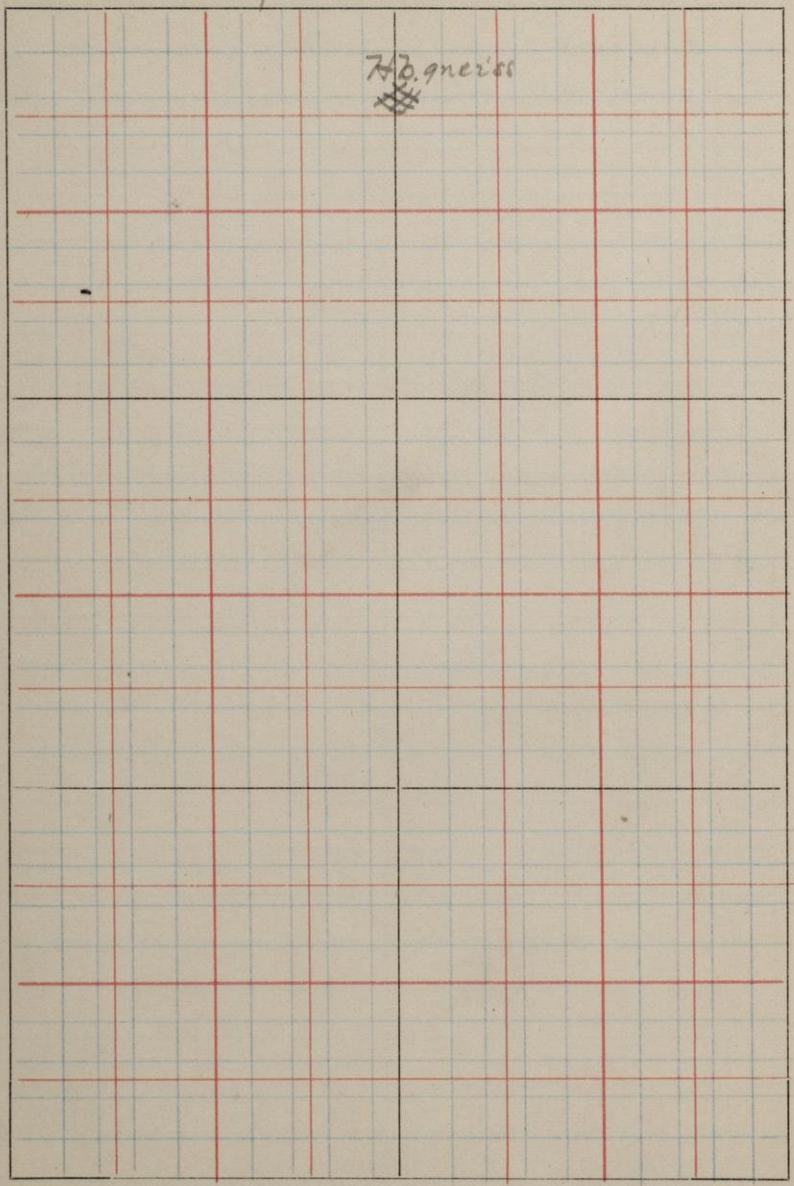
29545 00 N. 225 W. 36-07-23
Quartzite Dip 5° S.

19 T. 57 R. 22



29546 1000 W. 150 N 19-57-22
Greenstone. The granite lies
just south of it

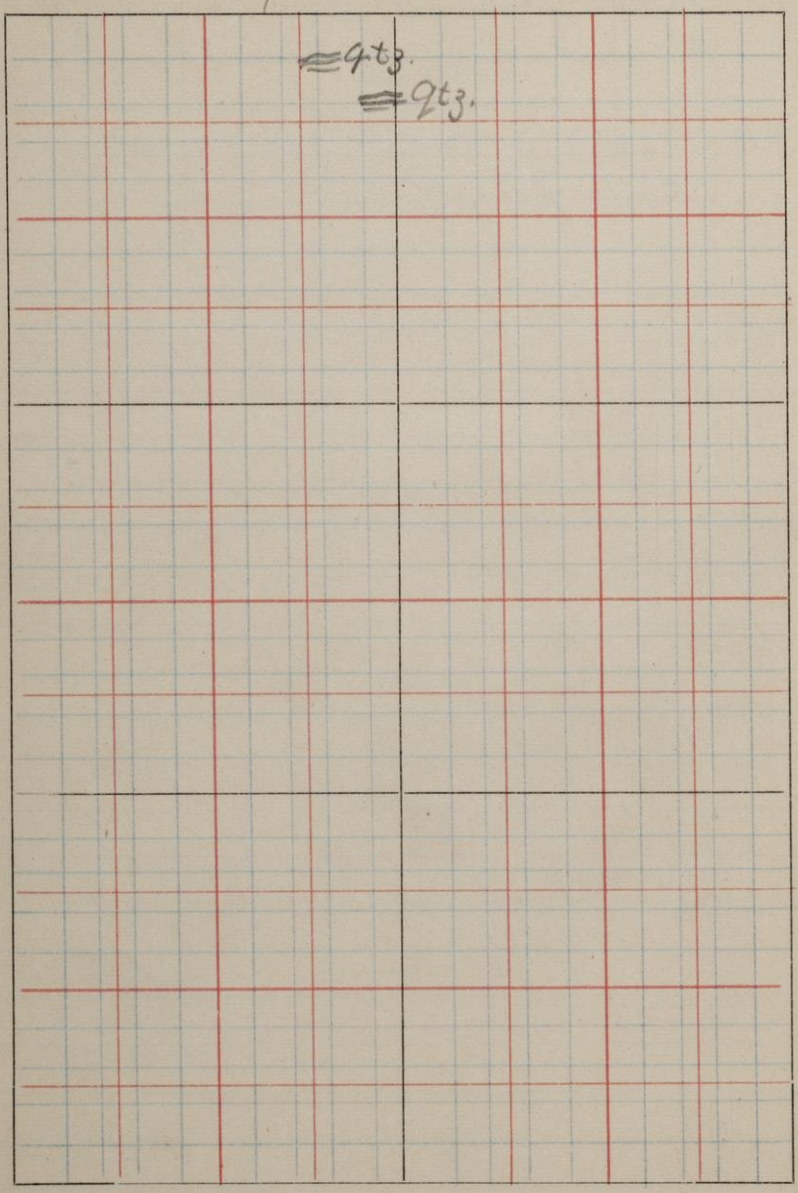
30 T. 57 R. 22



V9547 1800 N. 1000 W. 30-57-22
Mica schist or gneiss

V9548 1050 N. 1950 W. 36-57-23
White Quartzite

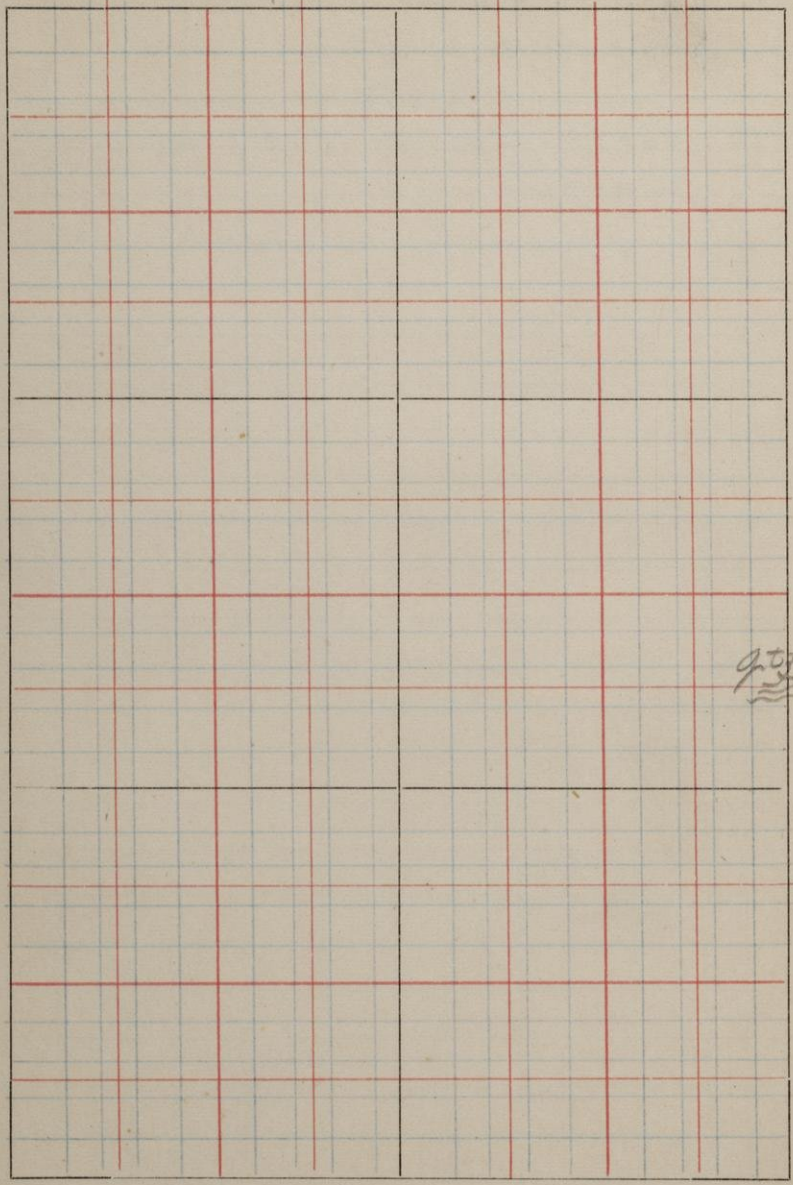
7 T. 57 R. 21



29549 1800 N. 1060 W. 7-07-21
Gray quartzite

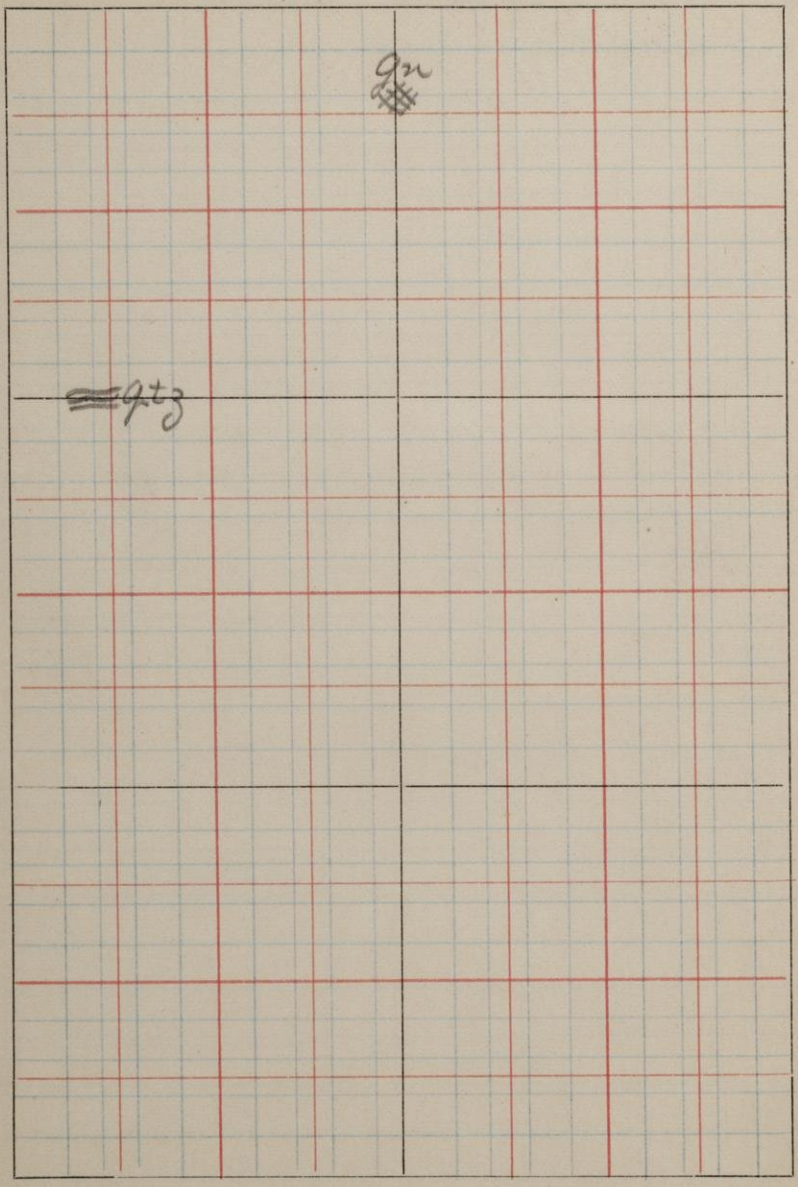
29550 1960 N. 1200 W. 7-07-21
Quartzite

6 T. 57 R. 21



29537 25 N. 00 W. 6-57-21
Bauld Jasper

4. T. 57 R. 21

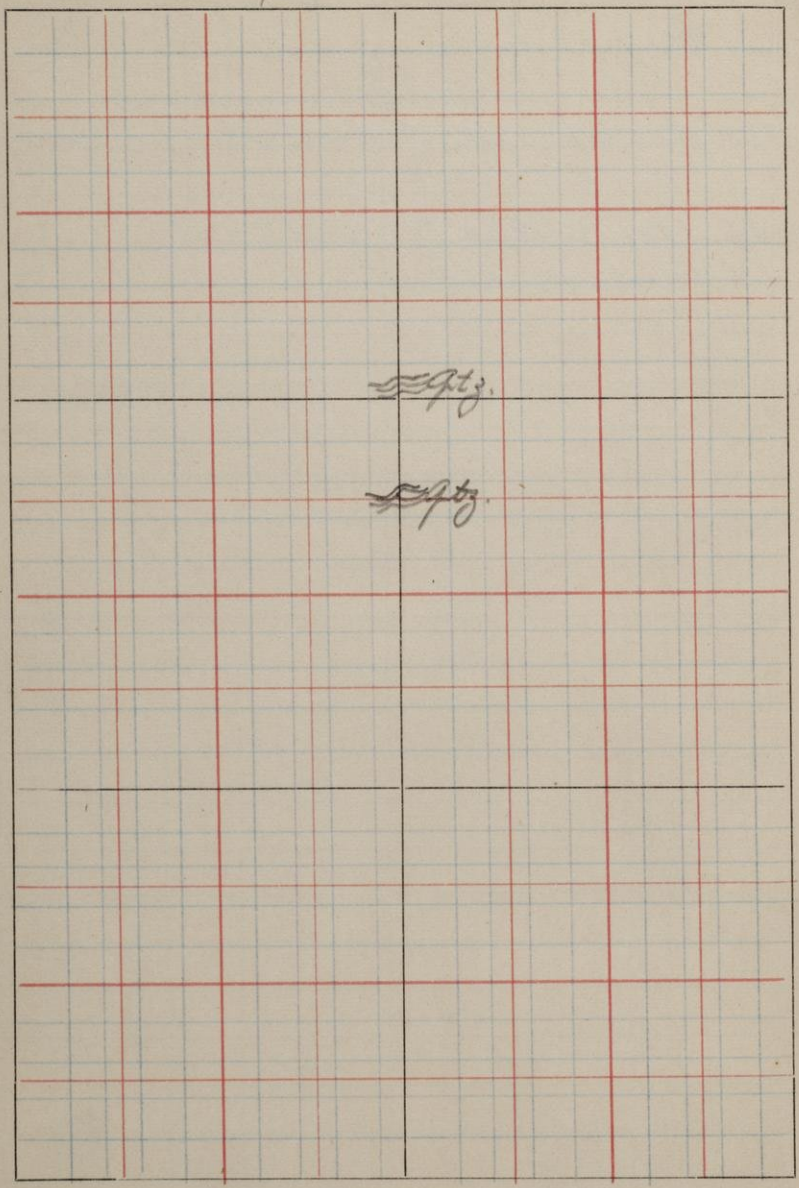


29552 1800 N. 1020 W. 4-57-21
Grey gneiss

29553 South side of same ledge as 29552

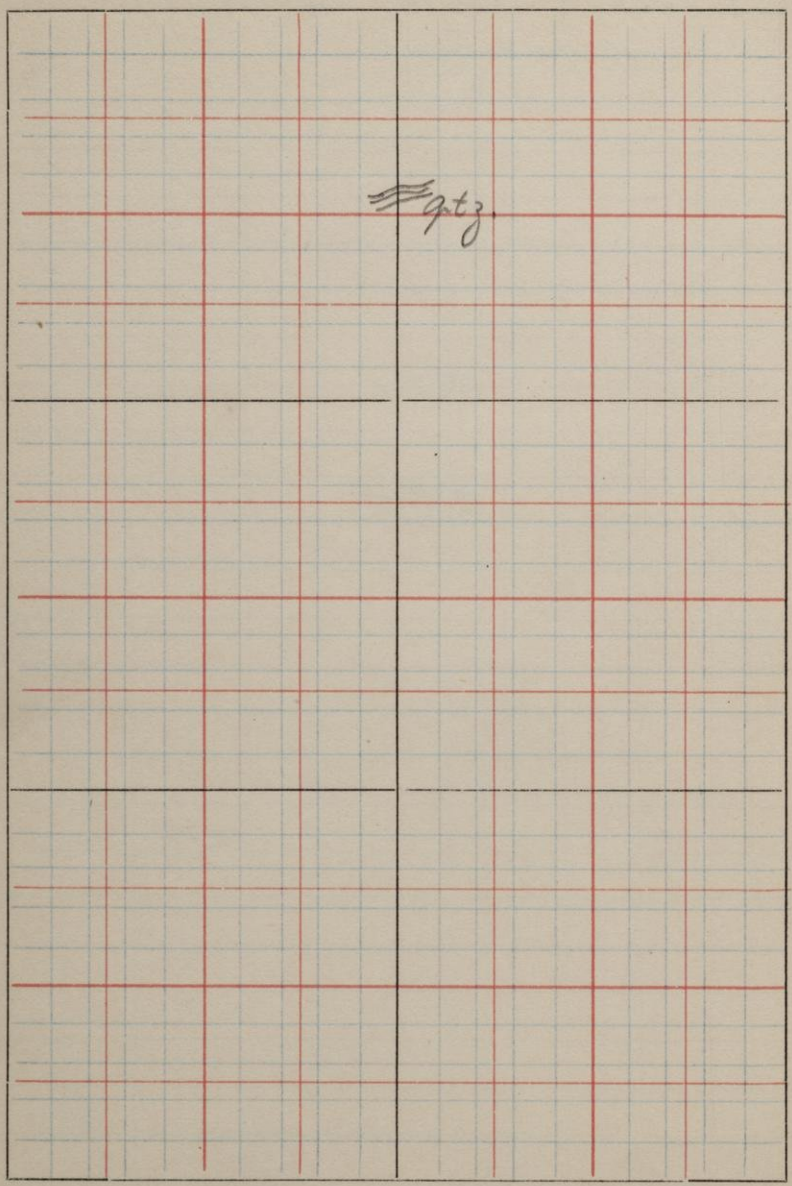
29554 1000 N. 1830 W. 4-57-21
Pink granite

S 4 T. 5 ~~S~~ R. 21



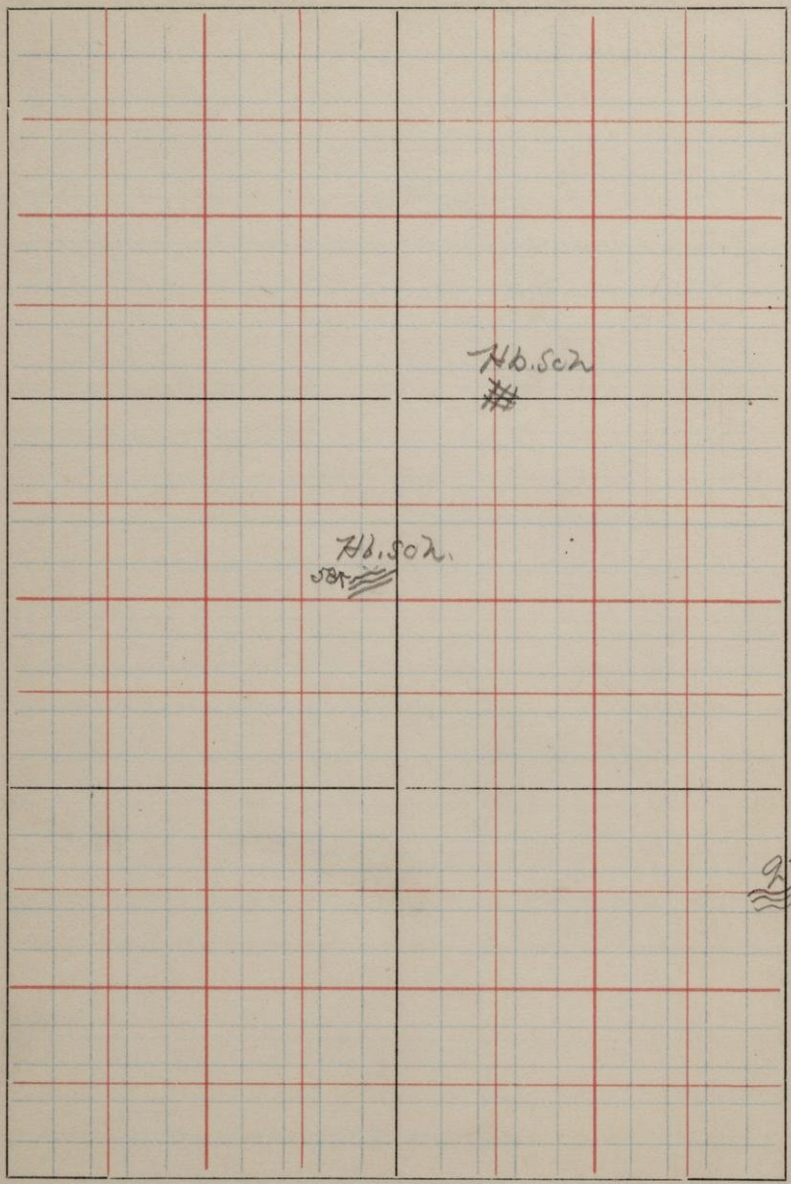
29558 1050 N. 1000 W. 34-58-21
Pink quartzite

35 T. 58 R. 21



29056 1650 N. 1000 W. 30-58-21
Quartzite

26 T. 58 R. 21



29057 | 58° N. 109° W. | 26-58-21
Green Sch. | Strike N. 30° E
Dip 58° N.

19 T. 08 R. 20

29558 600 N. 500 W. 19-38-20
Grey gneiss

29559 Band in 29558

29560 480 N. 75 W. 19-38-20
Quartzite

29561 See p. 5

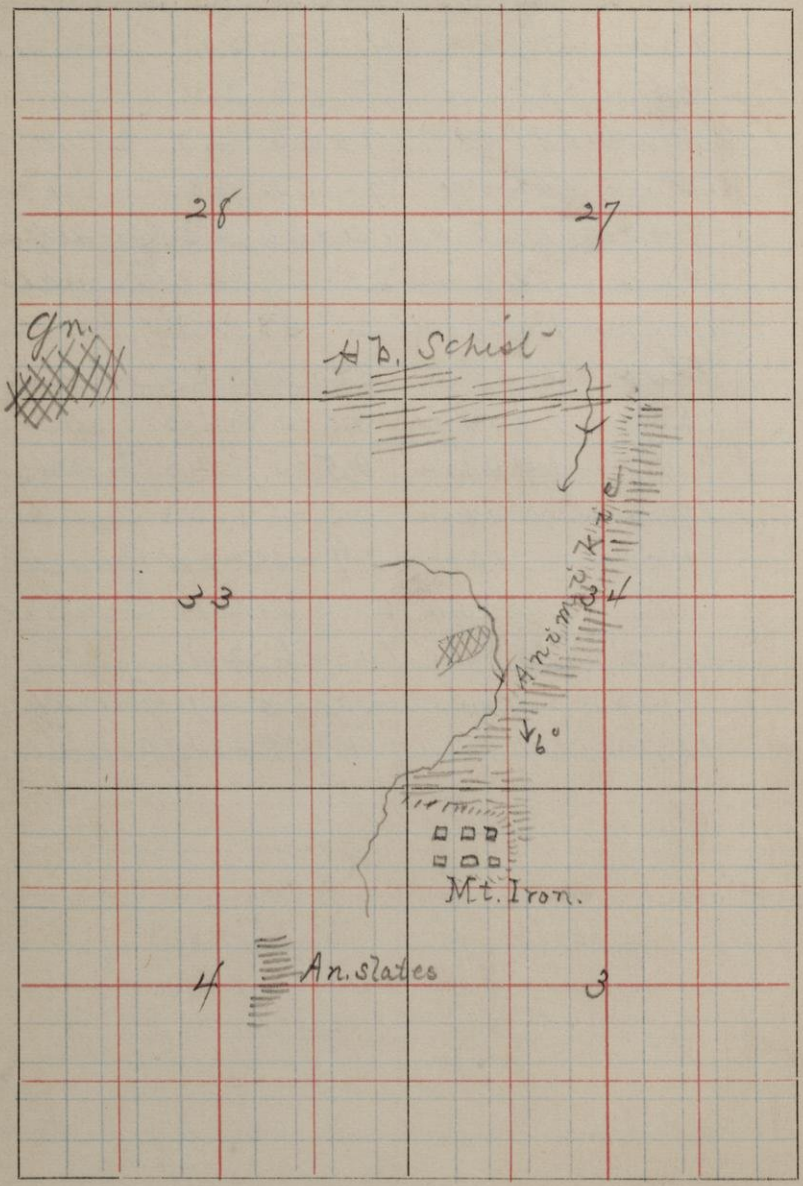
A large ledge of quartzite is exposed near the center of S.W 1/4 14-38-20

Locations obtained from E. J. Longyear. (located by D. Stowick)

1525 N	1450 W.	21-57-22	Granite
1900 "	1400 "	14-57-22	"
2000 "	575 "	12-57-22	"
1250 "	1450 "	30-57-22	"
1350 "	1450 "	30-57-22	Greenstone
1900 "	1450 "	30 57-22	Granite
1400 "	1990 "	4-57-22	"
500 "	1875 "	3-57-22	Quartzite
90 "	2000 "	11-58-20	Granite
800 "	500 "	12-58-20	"
1200 "	125 "	11-58-20	"
170 "	1500 "	11-58-20	"
875 "	1000 "	11-58-20	"
250 "	1500 "	14-58-20	Quartzite
550 "	1500 "	14-58-20	"
1815 "	1060 "	14-58-20	Granite
900 "	500 "	15-58-20	"
500 "	1000 "	19-58-20	Gneiss
1875 "	1640 "	22-58-20	"
1900 "	2000 "	2-56-23	Greenstone
1075 "	550 "	3-56-23	Granite
200 "	1500 "	3-56-23	"
1800 "	2000	2-56-23	"

0 N.	955 W.	3-56-23	Quartzite
10 "	375 "	4-56-23	Granite
65 "	180 "	5-56-23	"
100 "	1810 "	7-56-23	"
1875 "	1540 "	9-56-23	"
940 "	1500 "	10-56-23	Quartzite
1940 "	40 "	25-57-23	Greenstone
1050 "	1000 "	25-57-23	"
400 -	1850 "	32-57-23	Granite
1250 -	1000 "	35-57-23	"
50 "	1450 "	35-57-23	Quartzite
1700 "	500 "	35-57-23	Granite
400 "	10 "	17-56-24	Quartzite
00 "	1400 "	2-56-24	Granite
1400 "	1500 "	10-56-24	"
500 "	2000 "	20-58-21	Quartzite
1150 "	1130 "	11-58-21	Greenstone

T. 59 R. 18



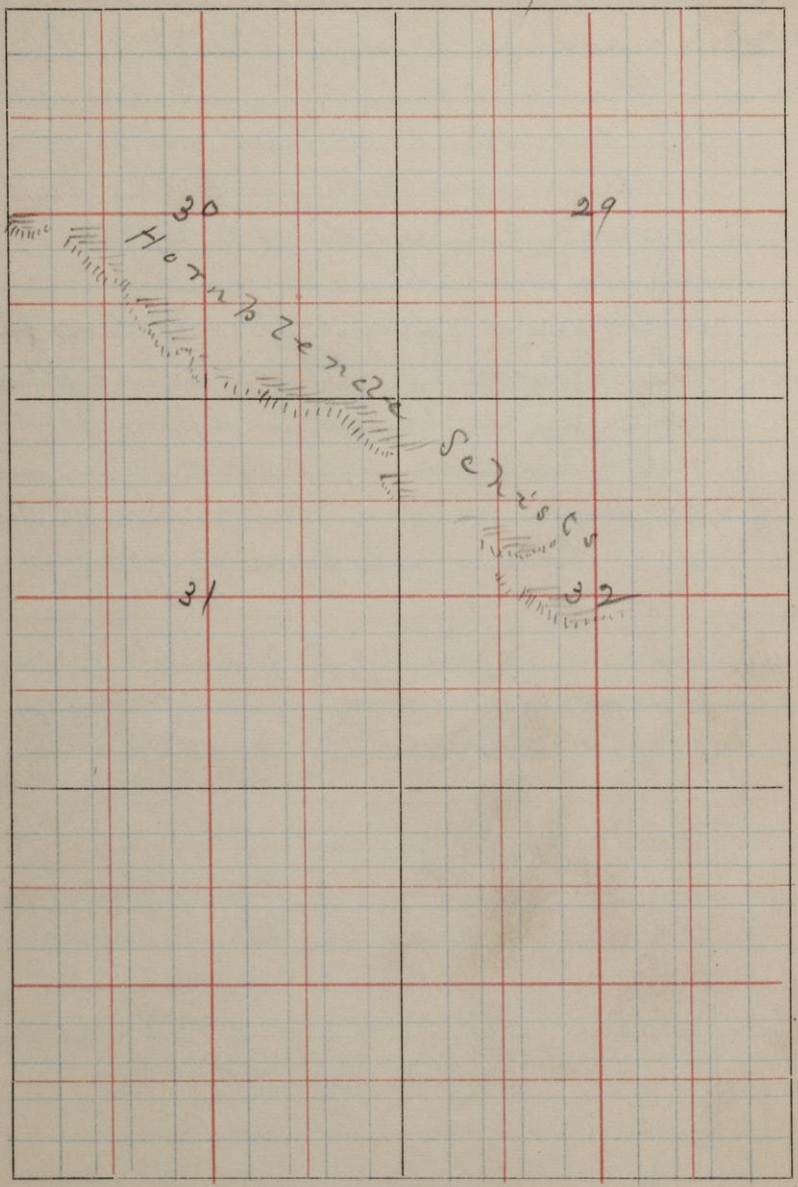
29538 From the hornblende schists
29539 a few slips east of the N. 1/4 post
of Sec. 34-59-18 To the west
the hornblende schist are exposed
continuously to beyond the N. W.
corner of 34 in large exposures
To the east the Animikie slates
are exposed about 50 slips from
the schists Their dip is flat
and no increase in it is seen
as the schists are approached
A little S.W. of the center of 34
is a large exposure of grey granite

Large exposures of granite are
exposed near the S.W. corners of
28 and 29-59-18

The map on opposite page shows
relative positions of Animikie and
old rocks near the Mc. Iron mine

In the N.W. 1/4 of Sec 6-58-18
the Animikie is exposed

T. 59 R. 17



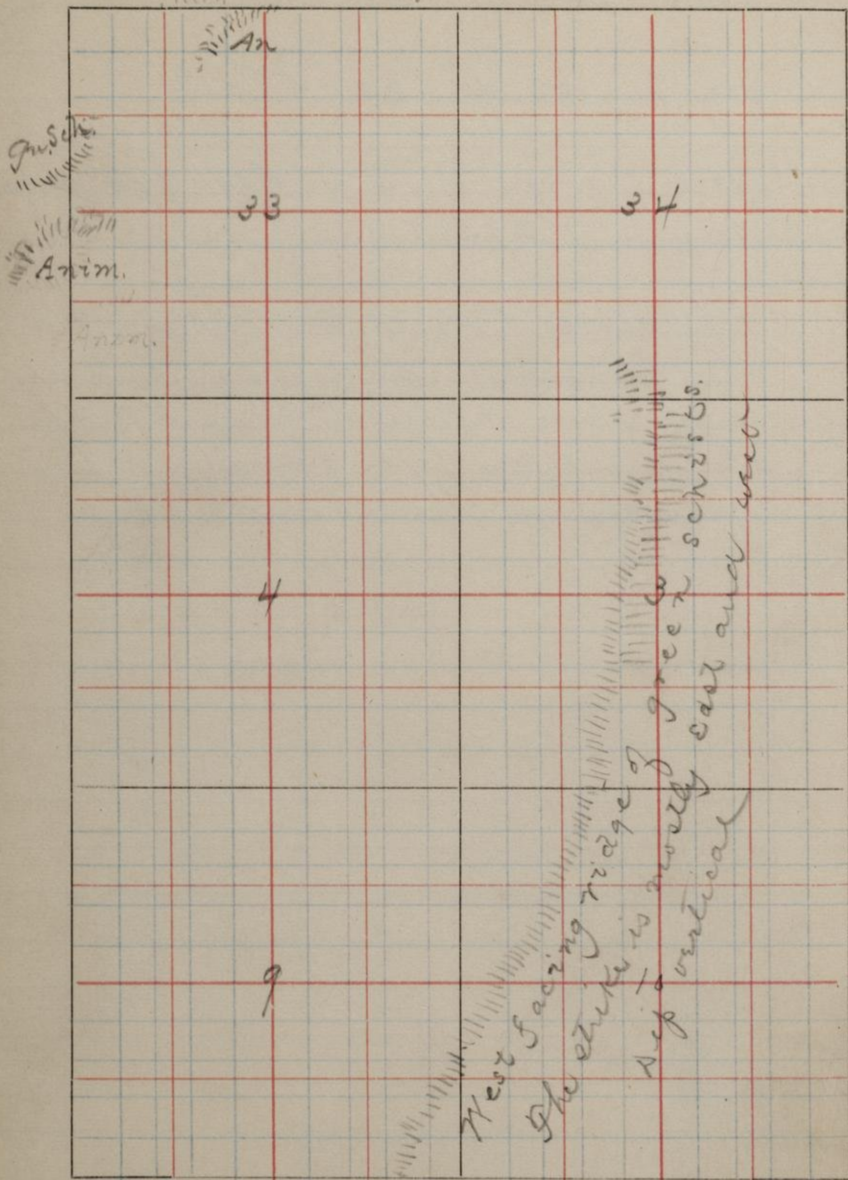
29540 500 N. 2000 W. 20-59-17

29541 2000 N. 00 W. 21-59-17

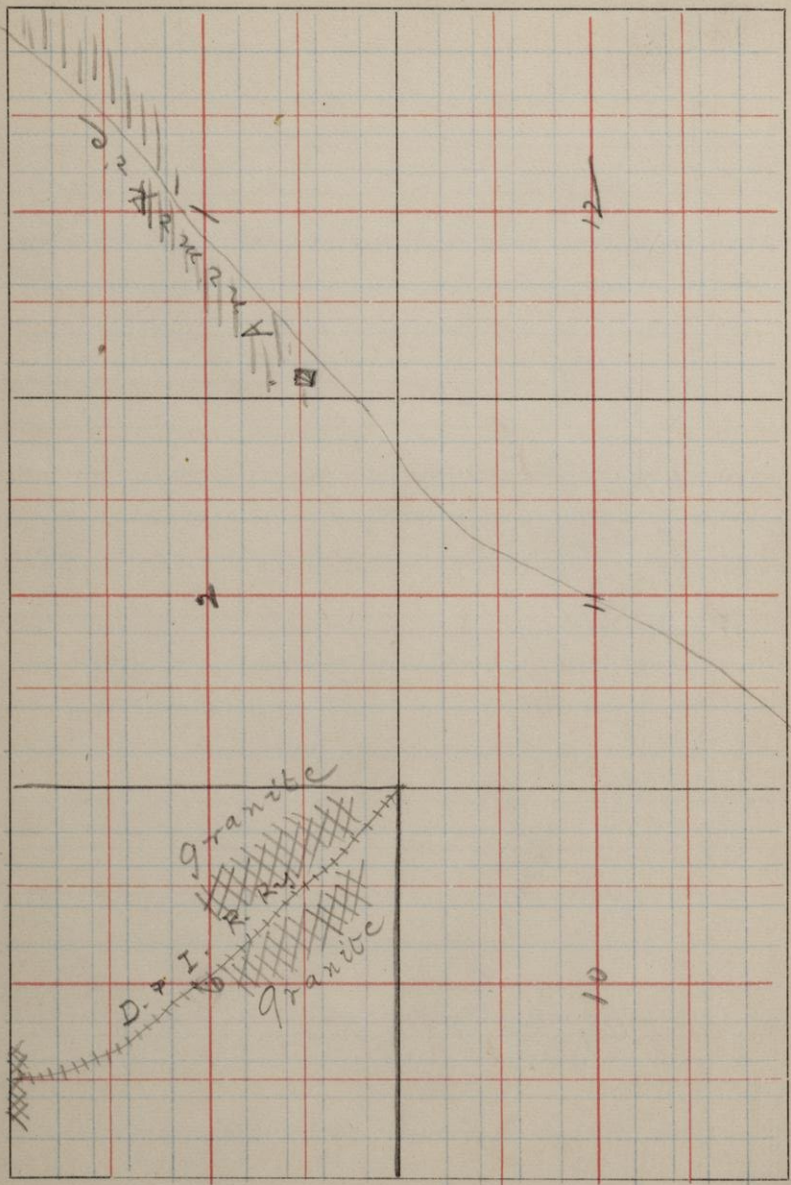
29542
29543
29544
} Taken from N. & S. for 700 ft. south of 29541

The above 5 specs. are taken from the hornblende and green schists and show different phases of the older schists lying south of the granite in this region

T. 58-57 R. 17

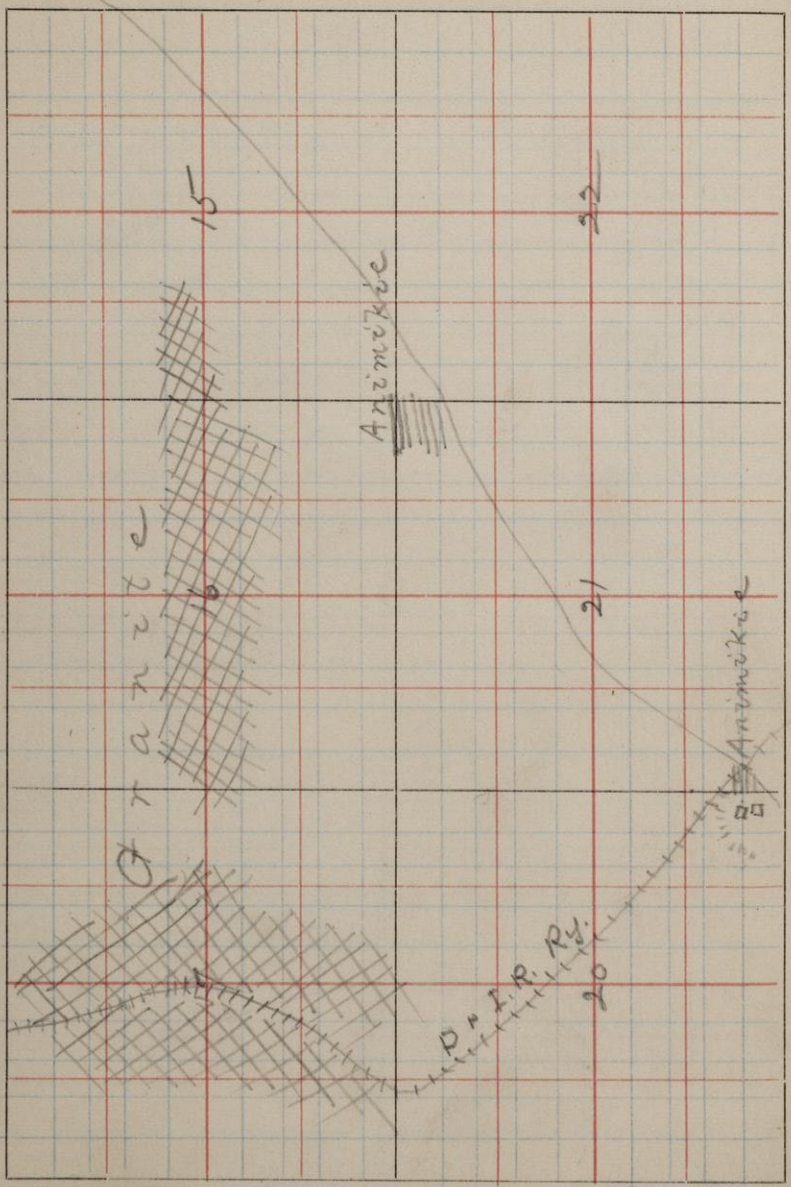

Gn Sch
An
Gn Sch
Anim.
Anim.
33
34
4
9
West facing ridge of green schists.
The strike is mostly east and west
Dip is vertical

T. 59 R. 14



2

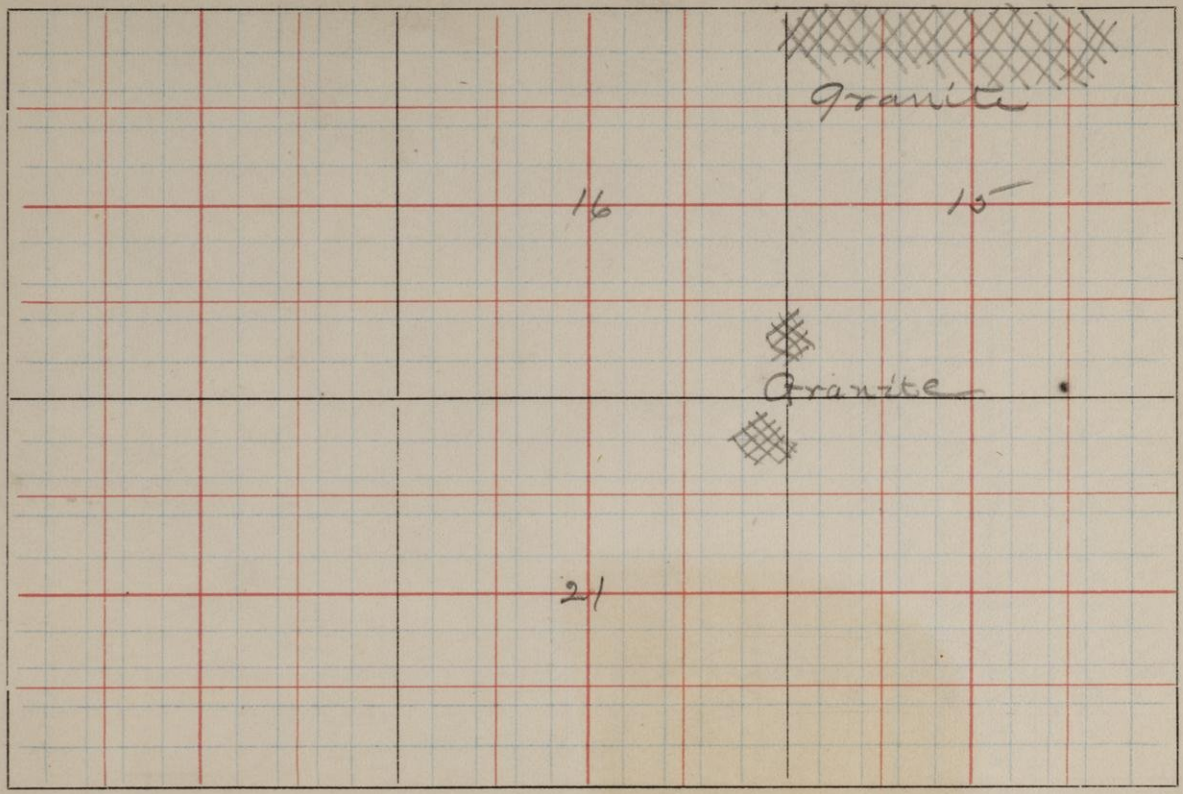
T. 59 R. 14



29562 S. W. of N. W. 15-59-14
I This mica schist is exposed all across 16 and into 15

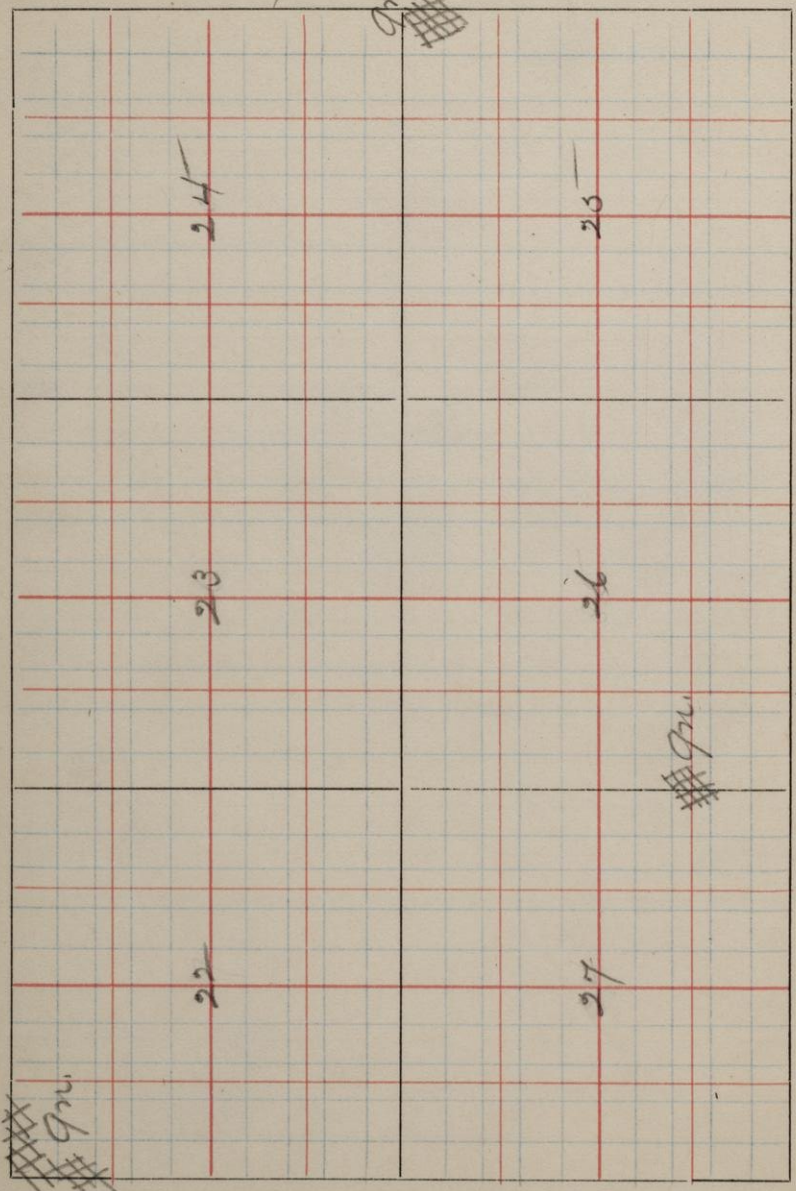
29563 1500 W. 2000 N. 20-59-14
II Strike E & W. dip Vertical
The same rock is exposed in S. ½ of N. ½. 15-59-14

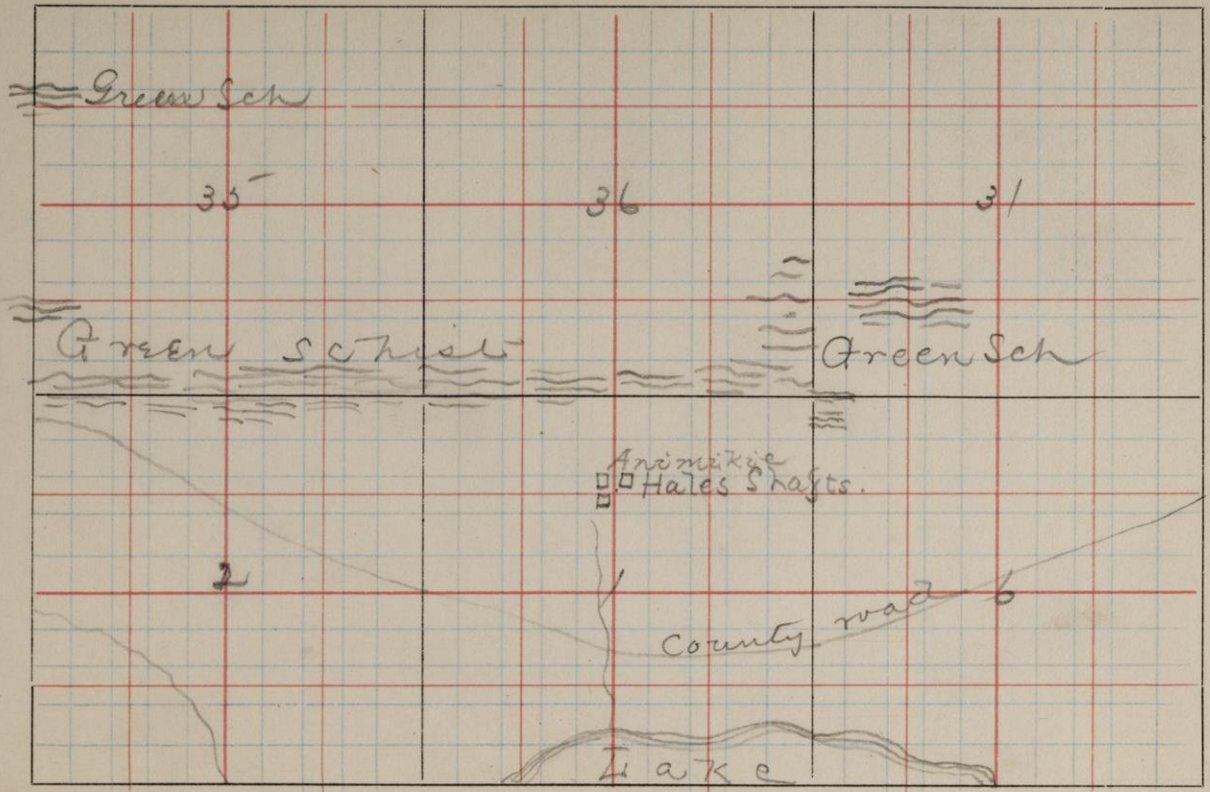
29564 S. W. of S. W. 26-59-14 (16 ½)
IV (last)


Granite
16
15
Granite
21
T. 59
R. 15

29565 1780 N. 00 W. 21-5-9-15
VIII Granite

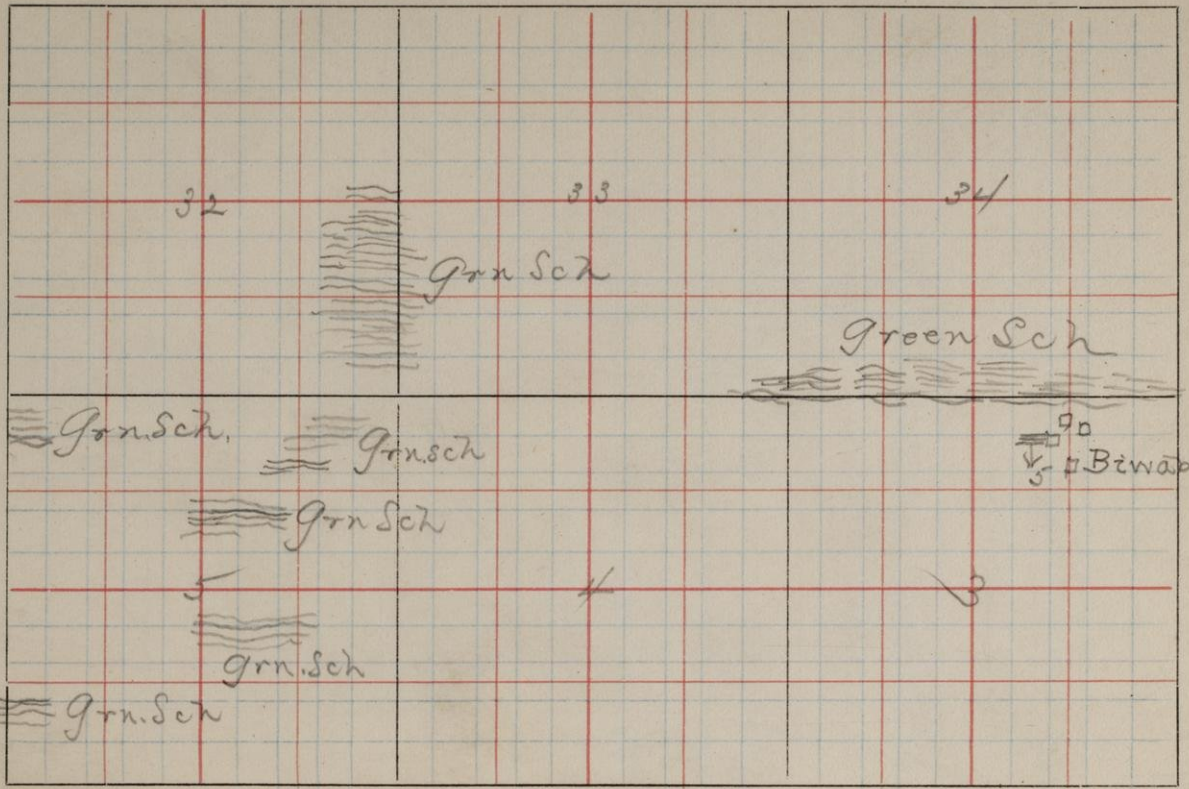
T. 59 R. 16





T. 58 and 59 R. 16 - 13

29566 XI	1850 N. 1880 W. Green Sch	6-58-15
29567 XII	1890 N. 1880 W. Green Sch	6-58-15
29568 XIII	2000 N 1800 W. Green Sch.	6-58-15
29569 XIV	100 N. 00 W Green Sch	36-59-16
29570 XVI	1900 N. 1900 W. Granite	30-59-15
29571 XVII	1900 N. 1000 W. Green Sch	2-58-16


32
33
34
Grn Sch
Green Sch
Grn.Sch.
Grn.sch
Grn Sch
Grn.Sch
Grn.Sch
Biwabik
5
4
3

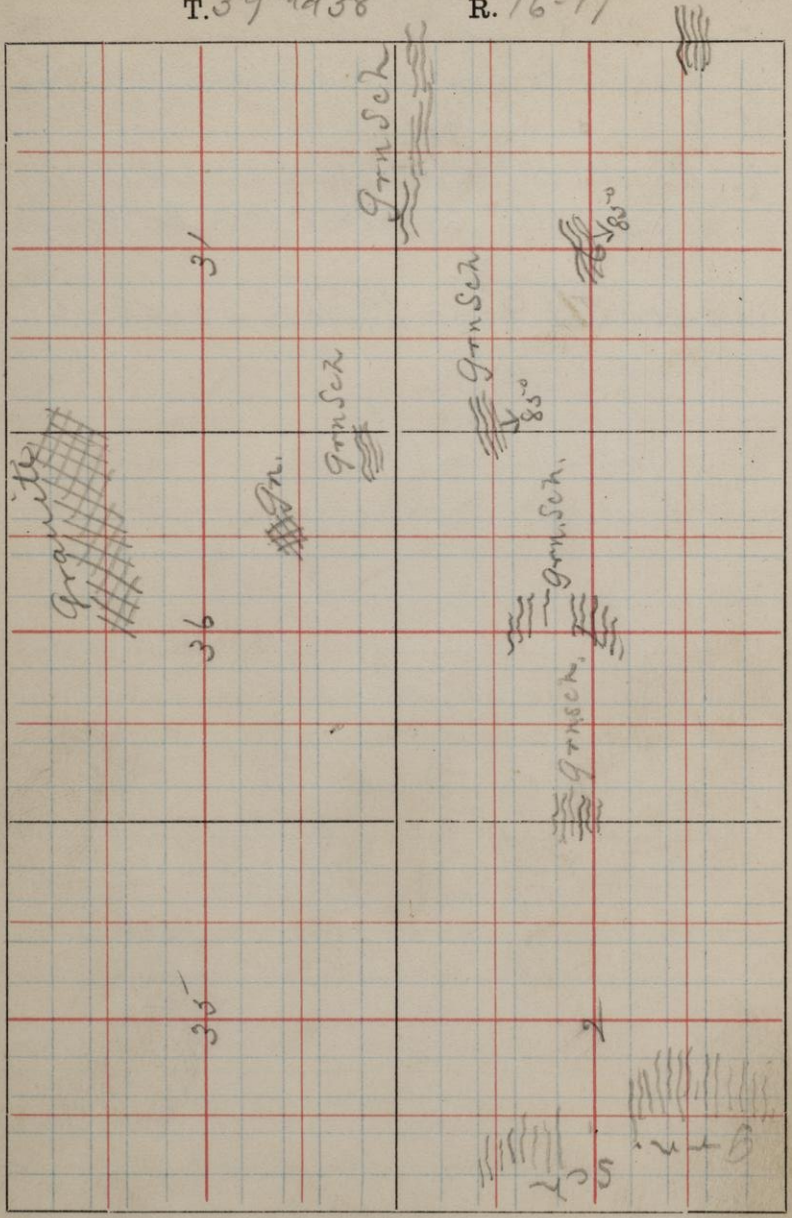
T. 58 N. R. 16

29572 N. W of N.E. 3-58-16
XVIII Slate from Biwabik mine

29573 N. W. of N. W. 22-59-16
XIX Granite ridges run to the S.E.

29574 2000 N. 1950 W. S.E. 3-58-16
SP

T. 59 and 58 R. 16-17



29575 200 N. 00 W. 6-58-16 Sl.
29576 29574 is a dike 1H" wide cutting
29577 29573-29576
XXI
XXII
XXIII
29578 Near the N.W corner of 8-58-18
XXIV From the Biwabik pits west of
Mt. Iron. 2.

29579 2000 N. 1050 W. 34-59-18
XXV

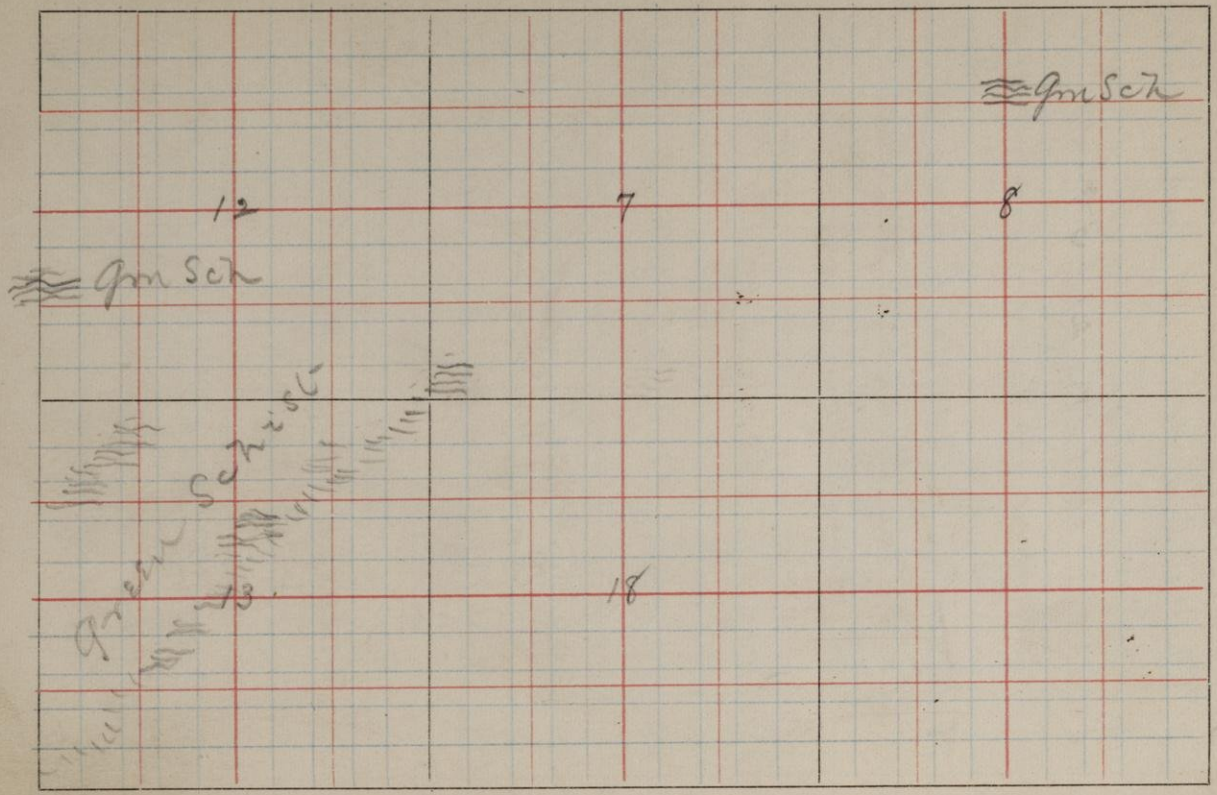
29580 40 slips N. of 29577
XXVI

29581 200 N. 2000 W. 27-59-18
XXVII Banded Ht. Sch + 2.

29582 200 N. 1720 W. 34-59-18
XXVIII 2

29583 2000 N. 100 W. 33-59-18
XXIX Ht. 2.

29584 2000 N. 300 W. 33-59-18
XXX 2.


12
7
8
18
T.
R.

29585 N. side of S.W¼ 17-58-19
XXXI From the North Star Co's shafts
Taconite

29586 500 N. 1000 W. 21-58-18
XXXII Granite

29587 500 N. on W. 30-58-17
XXXIV Dip N.W. 5° Taconite

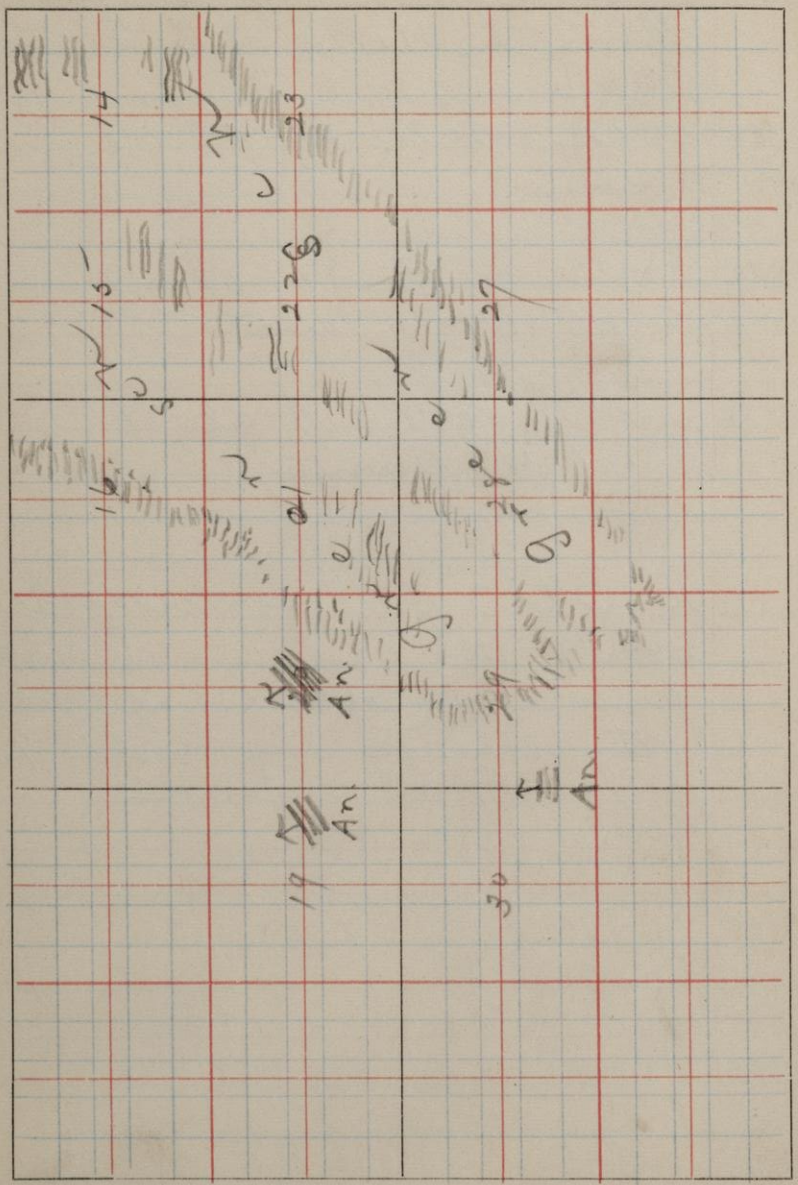
29588 1000 N. 500 W. 19-58-17
XXXV Dip N.W. Taconite

Near the S.W. corner of Sec 26-59-14 there is a small granite knob rising apparently through the Animikie probably an island

29589 1500 N. on W. 21-58-17
XXXVI Greenschist

29590 1500 N. on W. 20-58-17
XXXVII Greenschist

T. 58 R. 17



29591 Drill cores from the Mt. Iron property in Sec 32-59-18

29592 From Longyear's drill east of Mesabi Sta.

29593 Granite from a large angular piece of drift in road 13 miles west of Mesabi Sta

The Animikie along the west half of the range from Prairie river to Mesabi Sta. is represented by the vitrious quartzites grading from these into the ferruginous quartzites all the prospects along this end of the range are in this latter material and have been abandoned with the exception of those of Longyear in Sec 1 56-23 and Tit 36-58-21

As we go east the last quartzite (vitreous) is seen in Sec 14-58-20

Between this point and the Mt. Iron, the Animikie was seen only in the test pits of the North star people Here it shows as a more slaty rock partially replaced by oxide of iron

At the Mt. Iron in 3-58-18 There is about 250 000 tons of ore in sight The ore is a second class brown, red and yellow oxide of iron carrying 61½% iron and .045% of phos.

The examination of the shafts shows a beautiful example of the replacement of the Aminskie slates by oxide of iron. The dip in some of the shafts is as high as 10° S. the south. At the bottom of the shafts the ore becomes too silicious to work.

At the Biwabik in 3-58-16 the same conditions occur except that the dip is flatter and the main shaft is bottomed in a loose sand which may represent the eastward continuation of the quartzite.

At Hale's camp in Sec 1-58-16 they have struck the ore in several shafts but have not as yet done much work.

No carbonates were seen in this vicinity.

The green schists of this region seem to be of series of vertical hornblende, mica and chloritic schists and slates, striking almost east and west. In general they resemble very closely those hornblende and green schists found north of the granite, and may possibly be the same the granite having broken across a portion of the series and left those on the south.