Crystall Falls district, Michigan: [specimens] 32132-32199, 32787-32850. No. 288 July 1892

Maurer, E. R.; Bayley, William Shirley, 1861-1943
[s.l.]: [s.n.], July 1892

LAKE SUPERIOR SURVEY

Crystal Falls District
Michigan
E. R. Maurer and
H. J. Bayley

32132 - 32144, 32787-32800

LAKE SUPERIOR SURVEY.

INSTRUCTIONS.

Topography.—On the left-hand page map as much of the section as has actually been seen, counting each of the spaces between the blue lines as 100 paces, and 20 of these spaces to one mile, or 2,000 paces. The scale is four inches to the mile, and the heavier blue lines, outlining one inch squares, mark forties. Denote streams, lakes, swamps, marshes, etc., by the topographical signs annexed.

The geologist will consult with the compassman, and describe as accurately as possible, the timber traversed. When pine is found, give its proportion; tell whether good or poor, and indicate kind—white, norway, jack. If hemlock is found, note the relative amount. In hard wood districts, designate as good or poor, heavy or light, and indicate predominant kinds, oak, maple, birch, etc. Cedar swamps, spruce swamps, tamarack swamps and meadow swamps will be always discriminated. Outline burnt timber.

Each day, just before leaving camp, the geologist will compare his own and the camp aneroids, and the reading of each, with time, will be recorded. At work the aneroid will be read on gentle slopes at intervals of 200 paces; on steeper slopes at intervals of 100 paces; also at all maxima and minima. When minima are streams the map and notes will indicate this, showing width and character of streams. When a stream has made a cut of importance, aneroid readings will be made where the banks break off and at water level. If instead of an abrupt break, the stream valley has steep slopes, aneroid readings will be made with sufficient frequency to show this character.

At reading points the compassman will stop, read the dial compass, and remain until the records are complete. The readings will, as fast as made, be placed upon the map at the right-hand side of the line traveled, and in the notes, the numbers being inclosed in parentheses, basing the work upon the bench-mark which served as a starting point. At bench-marks the absolute reading of the aneroid and the altitude as shown by the bench-mark will be recorded to serve as a base for subsequent readings. For instance, aneroid 29.13 inches; altitude on bench- mark, 275 feet. At each subsequent reading, by setting 275 on the altitude circle at 29.13 on the fixed dial, altitudes may be directly recorded. When the next bench-mark is found at two miles distance, the difference between the aneroid reading on the basis of the first bench-mark and the second bench-mark will be recorded. At intervals of a half hour during the day the time will be attached to the aneroid readings. Upon reaching camp, after the day's work, the geologist will record the readings of his own and the camp aneroid, and also the time. Interpolations will then be made, based upon the bench-marks and times (not distances) if the day has been one of no abnormal atmospheric disturbances, or upon both bench-marks and camp aneroid readings if there have been unusual disturbances, and the corrected numbers, less a constant of 4 feet, will be placed upon the face of the map at the left-hand side of the lines of travel, and in the notes without parentheses, but the parentheses numbers will not be erased.

At each aneroid reading the trend of a horizontal contour line will be indicated upon the face of the map, making the length of the line correspond as nearly as may be with the actual distance seen. In passing directly up or down a slope, the contour lines will be at right angles to the direction of travel. In passing up a hill diagonally the contour lines will intersect the lines of travel at various angles, which can be estimated and plotted with sufficient accuracy by an appreciation of the north and south direction.

The course of travel will be always north and south. In starting from a quarter or a sixteenth post, the work will be plotted on the assumption that the true course is followed, but upon reaching the next section line the geologist will remain in the position at which the line is struck by the compassman until the latter finds the adjacent bench-mark. The intervening distance will then be paced by the compassman, and the point of intersection of the section line marked. From this point to the starting-point, a right line will be drawn as the actual course of travel. The positions of the contour lines, aneroid readings, etc., will not be changed.

Geology. — In running the north and south lines, the compassman will, if possible, determine the course by the dial compass. At the time the geologist reads his aneroid, the compassman will determine the magnetic variation, which will be given to the geologist and recorded in the note-book. Each morning the watch of the compassman will be set to apparent time (corrections being made for the equation of time and for longitude), so that he will need to make no correction in reading magnetic variation. On cloudy days, and at times when the sun is too low for the use of the dial compass, the course run will be by needle upon the supposition that the magnetic variations indicated on the township plats are right when corrected by deducting 3° if the variation is east, or by adding the same amount if the variation is west.

Not less than once per week the accuracy of the watch of the geologist in charge of a party (who will give time each morning to the compassmen), will be tested. This may be done, first, by obtaining correct time from a railway station by means of a packer when sent out for provisions. Such time will be mean, i. e., watch time for the nintieth meridian. Second, corrected time may be found by blazing out a north and south section line, preferably a range line, for some distance, setting a signal on the line and placing the dial compass duly leveled, in a north and south direction upon a Jacob's-staff just before mid-day, and setting the watch at 12 at the time the line strikes the noon hour. In a watch thus set all corrections are made.

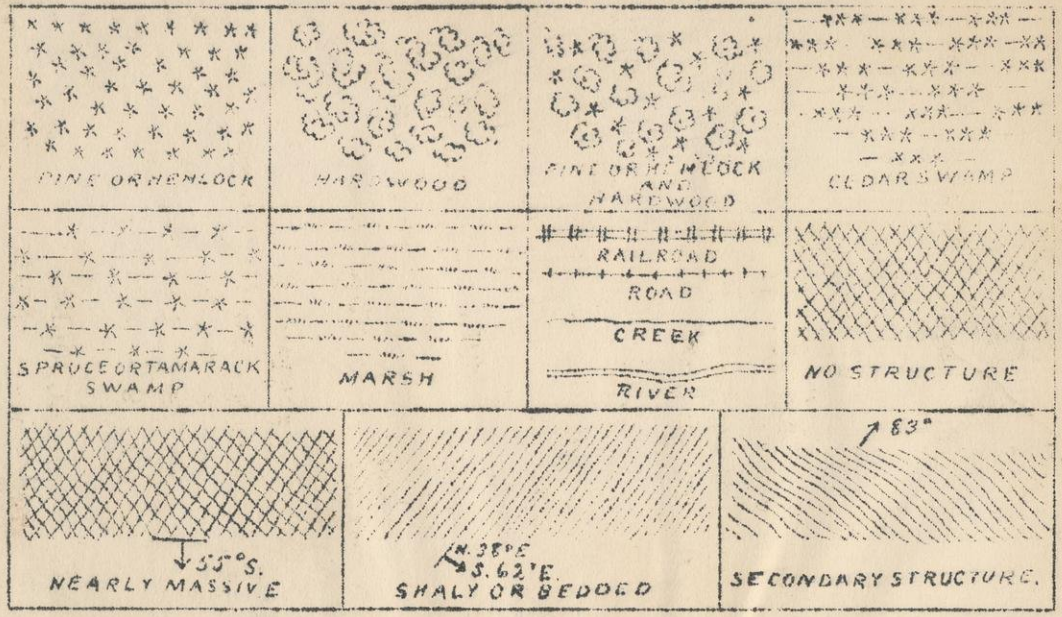
It will be the constant business of the geologist to search for outcrops. All hills within a reasonable distance of the course of travel will be examined. Oftentimes upon the steeper slopes of a hill a rock surface is covered with a coating a few inches thick of moss, leaves or vegetable mold and can be stripped with the pick. Where the exposure is small and there is the least possibility that it may be a large bowlder, indicate this fact in the notes and by a query on the map. All ledges off the line of travel of the compassman will be located by the geologist pacing to this line in an east and west direction, his course being determined by compass.

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, having strike line and dip arrow with numbers attached. 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 specimens representing it. 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, *No.* 437, 1226, *N.*, 353 *W.*, *Strike*, *N.* 47° *E.*, *Dip*, 68° *S. E.* Then follow with as full a description of the ledge as possible.

Collect a specimen from every ledge, and if the ledge exposes different kinds of rock, collect a specimen of all varieties. Take care to get fresh material, unless for a special purpose the weathered surface is desired. Where ledges are infrequent the normal size of specimens will be 3x4x1 inch. In case several specimens of the same ledge are necessary, and when ledges are numerous, specimens 2x2½x¾ inch will be allowed. In all cases collect chips for slicing. No two specimens will be given the same number. In the cases in which several specimens come from the same ledge, the different numbers assigned to them will enable an easy description of their relations. Specimens will be placed at once in paper bags provided, upon which shall be marked in at least two places, with a blue or red pencil, the specimen number.

TOPOGRAPHICAL SIGNS.



TIME EQUATIONS FOR 1892.

Days.	Min.	Days.	Min.	Days.	Min.	Days.	Min.

MAY.

Add to mean local time.

1-	5	3	6-21	4	22-30	3	-31 2

JUNE.

Add to mean local time.

1-	5	2	6-10	1	11-15	0	

Subtract from mean local time.

16-20	1	21-24	2	25-29	3	-30	4

JULY.

Subtract from mean local time.

1-	5	4	6-12	5	13-31 6

AUGUST.

Subtract from mean local time.

1-	6	6	7-13	5	14-17	4	18-22 3
23-25	2	26-29	1	30-31	0		

SEPTEMBER.

Add to mean local time.

1-	0	2-	4	1	5- 7	2	8-10 3
11-13	4	14-15	5		16-18	6	19-21 7
22-24	8	25-27	9		28-30	10	-31 11

OCTOBER.

Add to mean local time.

1- 3	11	4- 7	12	8-11	13
12-15	14	16-21	15	22-31	16

Dip at Amasa $76^{\circ}20' \pm$

SEPTEMBER.

Add to watch time.

1- 2	0	3- 5	1	6- 8	2
9-11	3	12-14	4	15-17	5
18-19	6	20-22	7	23-25	8
26-28	9	29-30	10		

OCTOBER.

Add to watch time.

1	10	2- 4	11	5- 8	12
9-12	13	13-16	14	17-22	15
23-31	16				

NOVEMBER.

Add to watch time.

1-13	16	14-19	15	20-23	14
24-26	13	27-29	12	30	11

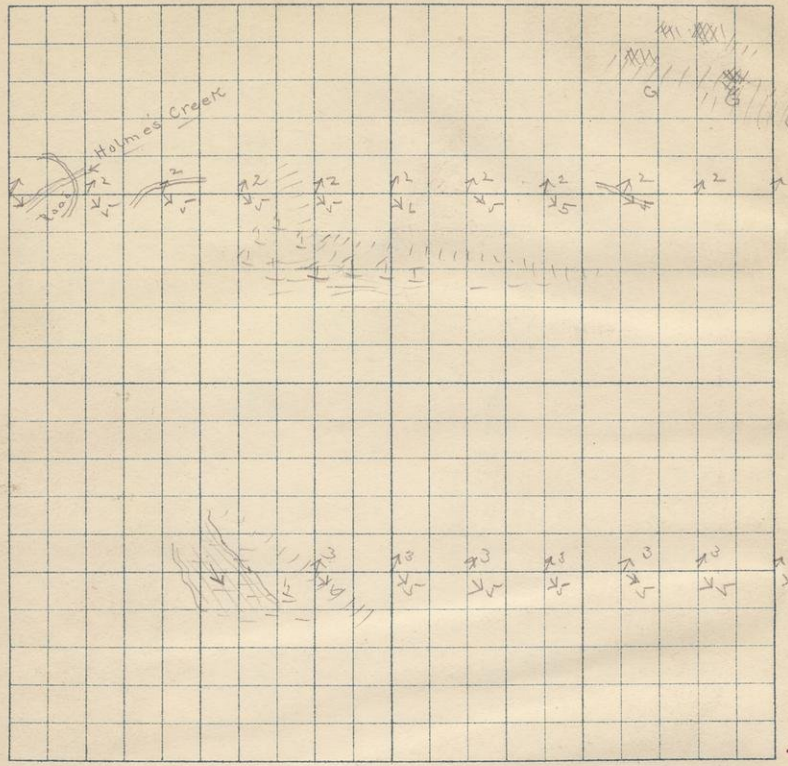
Book # 3

E R Maurel Zoologist
Felix Garicpy - Compassman

July 13 -
1892

Specimens 3213.2 -

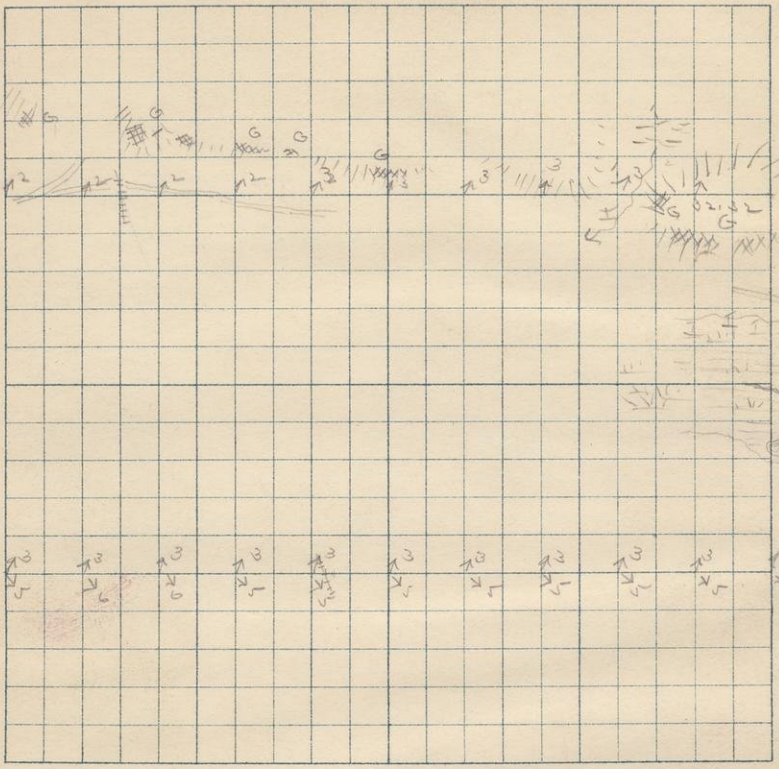
2 S.W. 1/4 S. 8 T. 43 R. 32



3z13z 750 N SE cor 8-43-32
G.D. Greenstone (diabase)
From extreme west end of long bluff of greenstone which begins near NW cor 7-43-32 and runs in an irregular line to this point
The greenstone in this bluff is about the same from one end to the other (like spec).
Siliceous shists & slates are associated with these greenstones bordering the bluff on the south.
For full notes on these rocks see W. N. Merriam.

at 1000 N 150 W. SE cor 5-43-32 is typical greenstone cong. weathers out the light colored fragments and looks just like the cong. near RR in sec 31-32-44-32
a few paces S. is a fine grained greenstone full of vein quartz. Thinks it belongs with the conglomerates

4 S.E. 1/4 S. 8 T. 43 R. 32



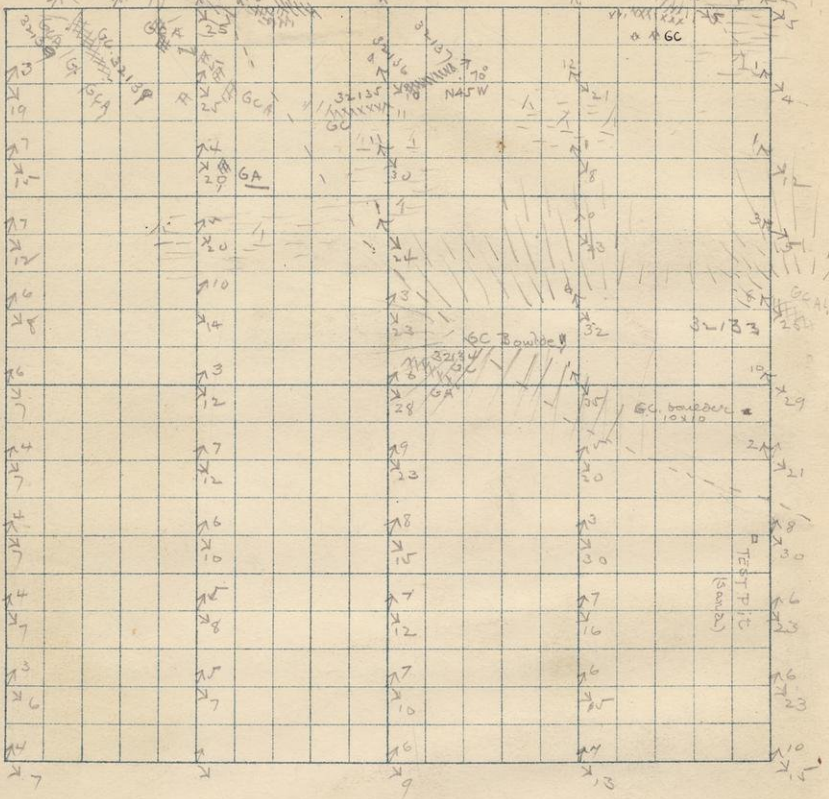
32133 600 N SE cor 5-43-32
G.A. Here is a large ledge extending
60 pcs to SE. Rock is fine and
coarse grained greenstone with
traces of amygdaloidal appearance.
One place I took the rock to
be dark amygdaloidal greenstone congl.
Most of the rock is like specimen
150 paces south is a block of
rock 10 x 10 like specimen which I
take to be a boulder

32134 560 N 450 W SE cor 5-43-32
G.A. Greenstone amygdaloid
Long ledge which is nearly all
amygdaloid. In places are
fine greenstones and dark congl., or
flowage breccia like 32135.
Could in no place find contact
or make out relative position in ledge

32135 850 N. 550 W SE cor 5-43-~~32~~
G.C. Greenstone congl. (flowage breccia)
This is a congl. like that usually
associated with the amygdaloid along

6

SE¼ Sec. 5 T. 43 R. 32

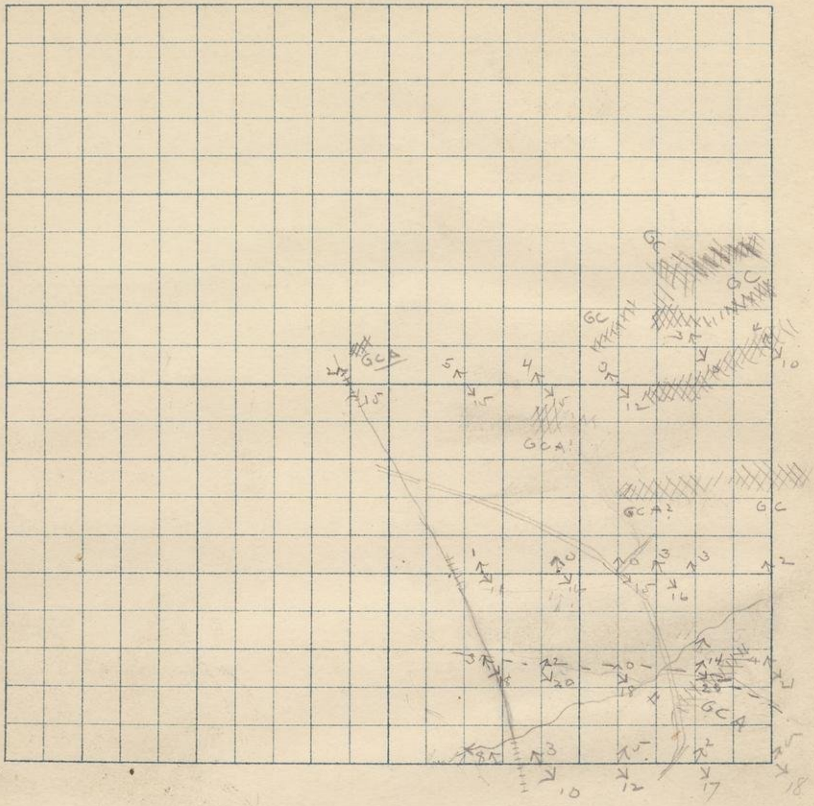


the lines of attraction in T 44-33
and is not the what I call the
typical one. (which is light colored
lathin grained mass and in pebbles.

32136 800N 475W SE cor. 5-43-32
32137 800N 425W " "
G.P. These two rocks are from
one ledge - the first from west
end ~~of~~ and the second from
east end of same. Between these
two kinds there is a perfect
gradation - no "contact" being
distinguishable. The only difference
besides that shown in specimens
is that 32136 is ~~not~~ almost
wholly massive while 32137 has
easy cleavage. I do not
think that this cleavage is bedding
- ~~that~~ at least there is nothing
in ledge to make me think it is.

Strike of cleavage N 45 W
Dip " " 70° NE

 NW 1/4 S. 5 T. 43 R. 32



Compare 32136&7 with 32117&19. as I remember the east end, there is a resemblance.

However this much is to be noticed, that this strike is parallel with line of attraction (see plat page 6) and is also parallel to a trace of arrangement and cleavage in the neighboring conglomerates.

Merriam thinks 32136 a eruptive porphyry and 32137 an amygdaloid.

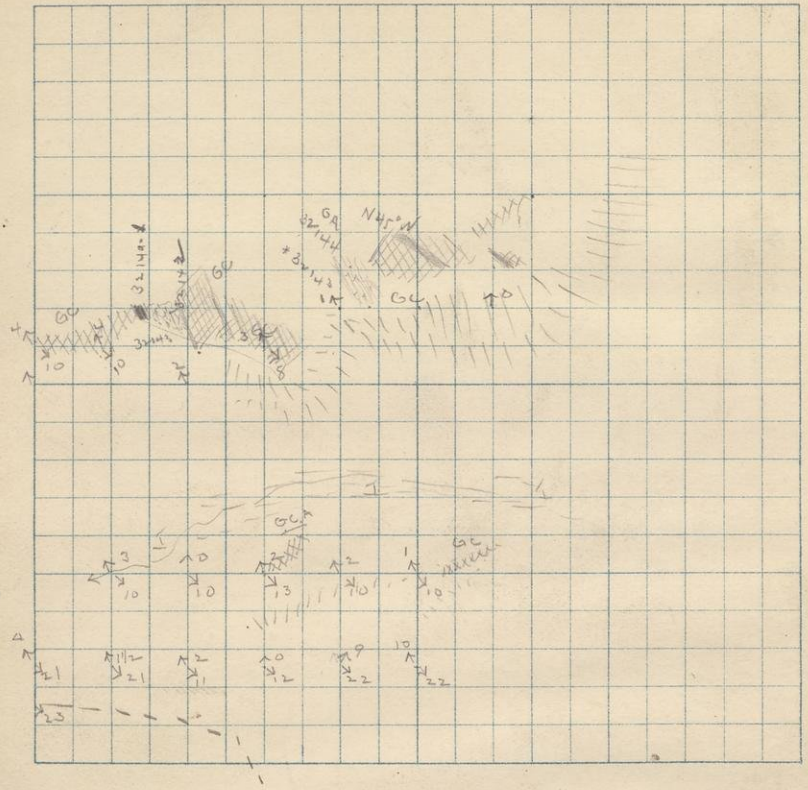
at 1000 N. 650 W. S-43-3 E is a large ledge like 32136 (massive) which I think is a continuation of 32136.

N. W of 32135 are ledges like 32135. I think that strike of this here is NW and SE or parallel to line of attractions.

32138 G.A. 950 N 900 W SE cor. S-43-3 E
Greenstone congl. (flow agg breccia) amygdaloidal

32139 G.A. 950 N 675 W SE cor S-43-3 E
Fine grained greenstone with quartz fillings (amygdaloidal?)
These two rocks are from

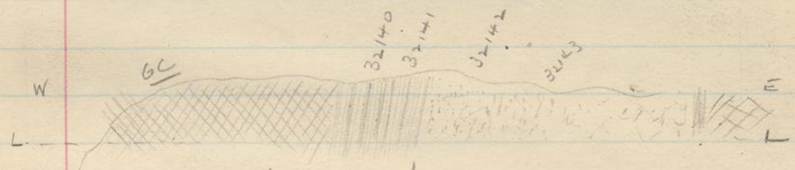
10 NE 1/4 S. 5 T. 43 R. 32



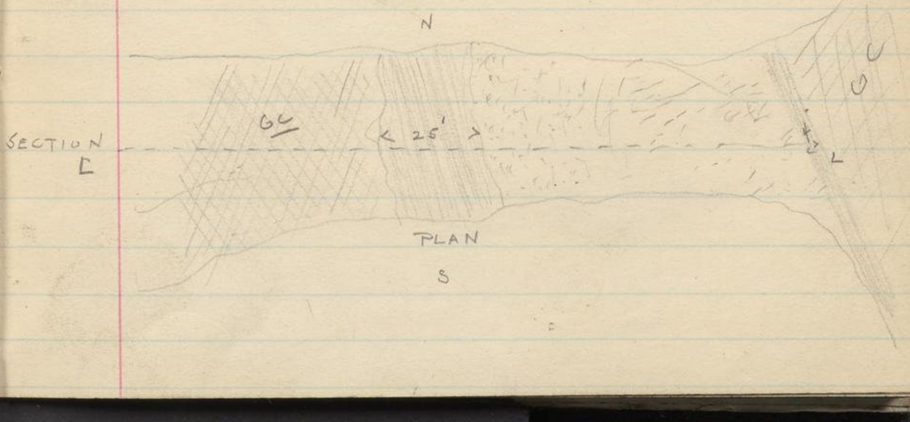
one large ledge near centre of 5-
Besides these two kinds of rock,
are fine greenstones without fillings,
some amygdaloid, and some light
colored typical greenstone conglom-.

Couldn't make out any relation
between the different phases.

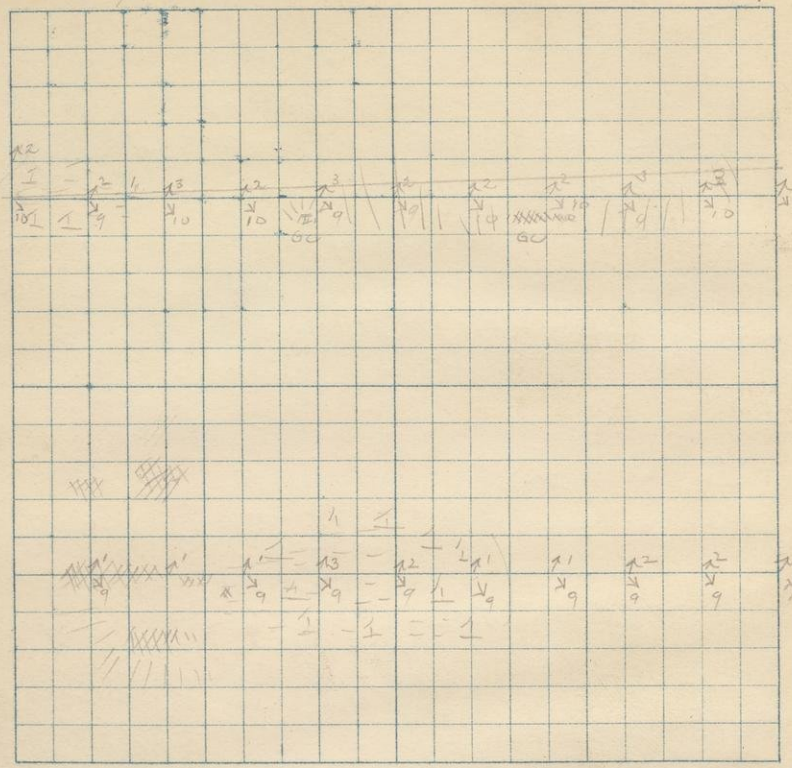
In some places there is a
trace of cleavage that strikes
NW and SE.
The ~~bag~~ bulk of the ledge is like
32138.



LOOKING NORTH



12 N. W 1/4 S. 4 T. 43 R. 32



3214
3214
3214
3214
G.C

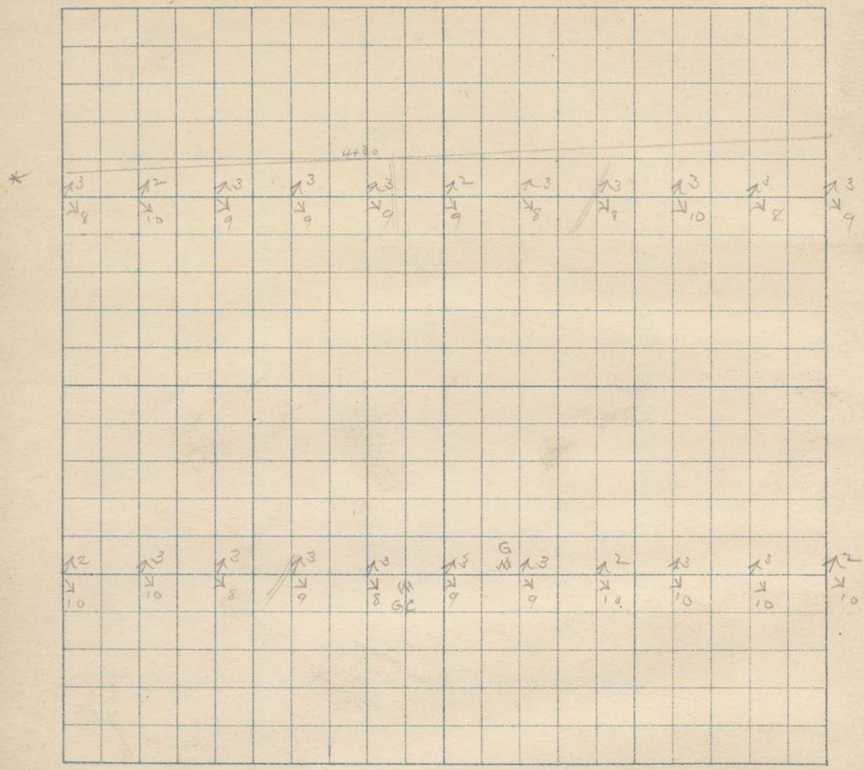
* Locations should be in pencil line;

See map p. 10, & sketch p. 11

32140 1600 N, 850 W SE cor 5-43-32
32141 " ~~84~~ 848 " "
32142 1600 N ~~84~~ 845 W " "
32143 1600 N 800 W " "
G.C. These four specimens are from a ledge sketch on p. 11. At the west end is a perfectly massive, light colored greenstone conglomerate next to the east comes 32140 & 41, banded greenstones or slates which show nice bedding strike of which is N 45° W dip vertical. Next to east comes 32142 & 3 that I take to be fine conglomerate or ashes.

The contact between the conglomerate and 32140-1 is well defined, sharp and nearly a right line, that between the banded greenstone and ash is not so distinct but can readily be followed and it also is quite straight and

NE 1/4 S. 4 T. 43 R. 32



*' Locations should be on pencil line

follows approximately the bedding of 32140-1. That 32140-1 are sedimentary I believe from the fact that similar banded rocks occur very plentifully in these conglomerates of this section all having approximately a strike of N 40°-55° W.

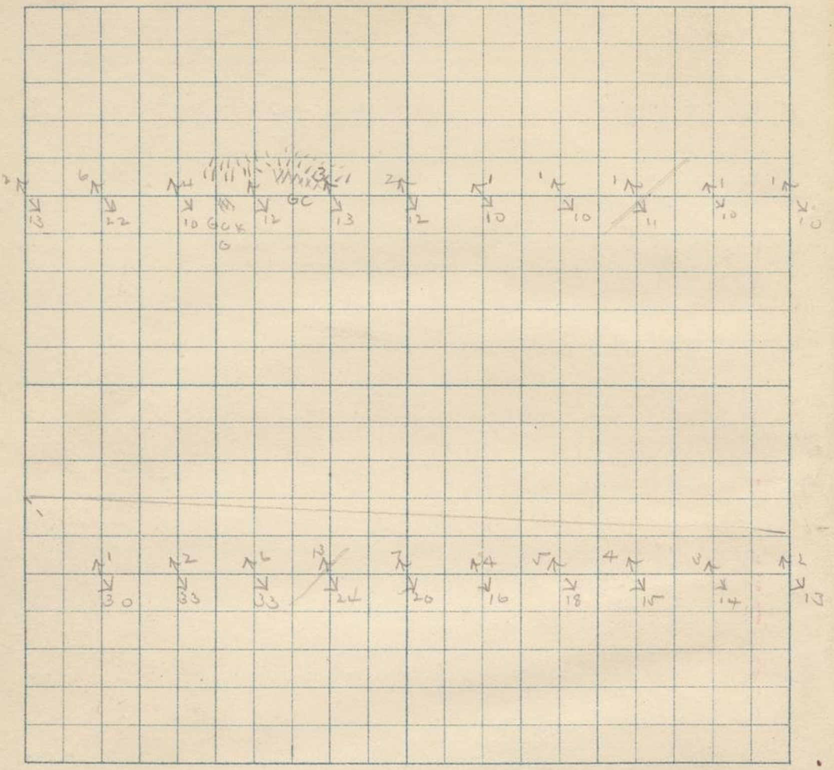
32144 1625 N - 575 W Alt cor 6-28-32
A.A. Greenstone amygdaloid.

see page 10 banded Gc. like 32140-1

The above is a section through ledge from which comes 32144. 32144 is irregularly interbedded with a rock similar to 32143.

To the east of the amygdaloid comes very coarse greenstone conglomerate with many beds of fine grained banded greenstones like 32140-1 all

S.W 1/4 S. 4 T. 43 R. 32

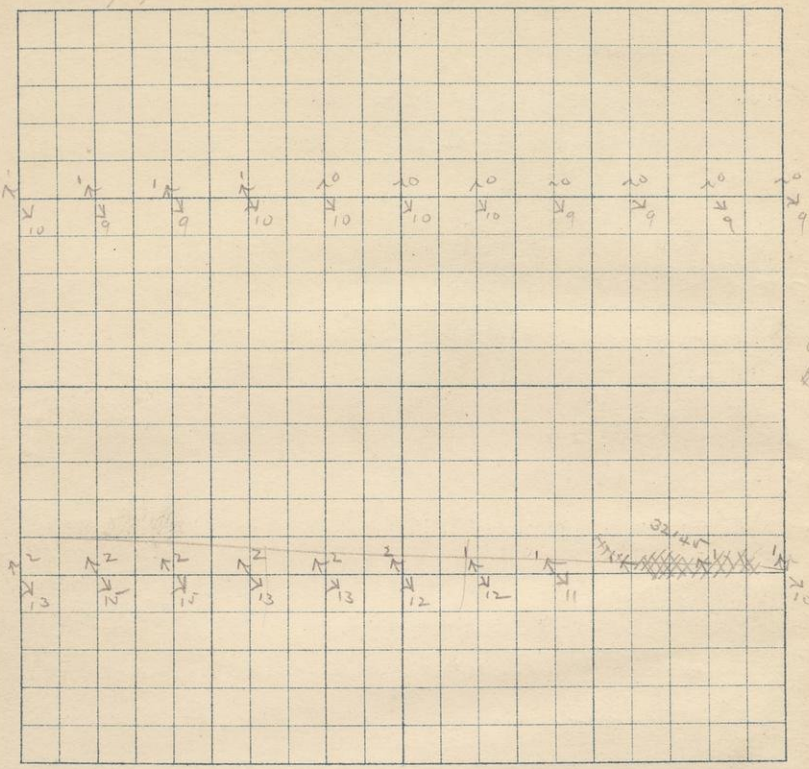


*. Locations should be on pencil line

of which have the uniform strike of N 55° W. dip vertical.
To the north east comes a fine ash?) (see Merriam)

32145 250 N - 100 W SE cor 4-43-32
G.C.M. Greenstone (belongs with G.C.)
From high bluff overlooking swamp to S. Nearly whole ledge is covered with moss and it may be that greenstone congl. is here also but I could not find it. I expected to as 32145 and G.C. go together in Sec. 5. About 1/2 mile north are several small ledges like this and in one, occurs G.C.

18 S.E 1/4 S. 4 T. 43 R. 32



32146
G.A.

32147
G.D.

32148
G.D.

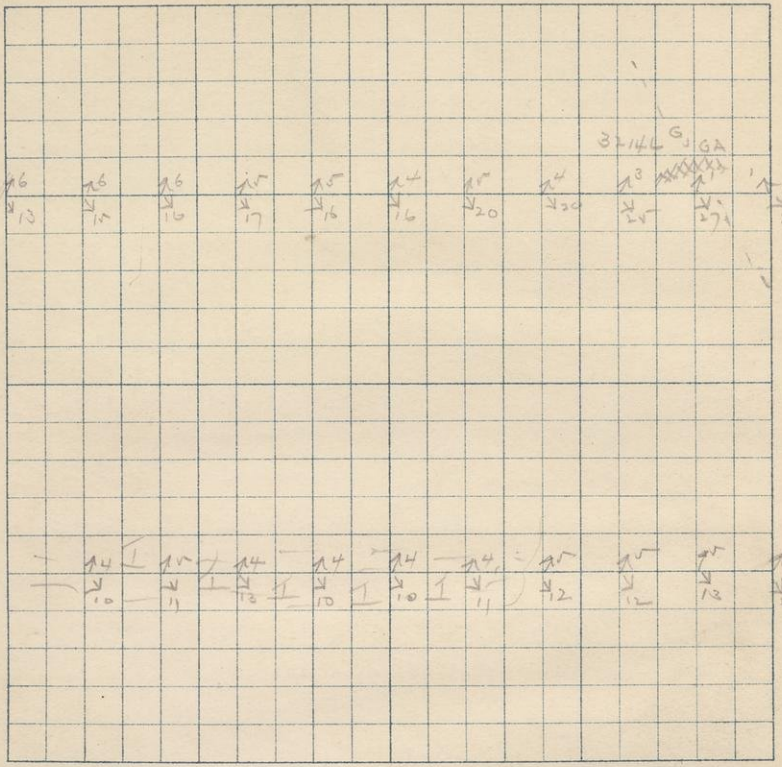
* locations should be on pencil line

32146 1800 N 1100 W SE cor. 9-43-32
G.A. From ledge showing greenstone amygdaloid (with quartz and other fillings) and a plain fine grained greenstone for matrix of specimen. Ledge is magnetic and is on mag. line (see plat page 20)

32147 For location see page 26
G.D. Greenstone diabase ("later")
From the east end of a long range of this same rock which runs from the point thru secs 8 and 16 N R W cor 7.

32148 200 N, 1150 W SE cor. 16-43-32
G.D. Large ledge of massive fine grained to medium coarse greenstone like specimen.
Ledge and specimen looks like others in sec 8 of this town that are closely associated with the conglomerate. In all the ledge thru I could not find any pebbles or fragments

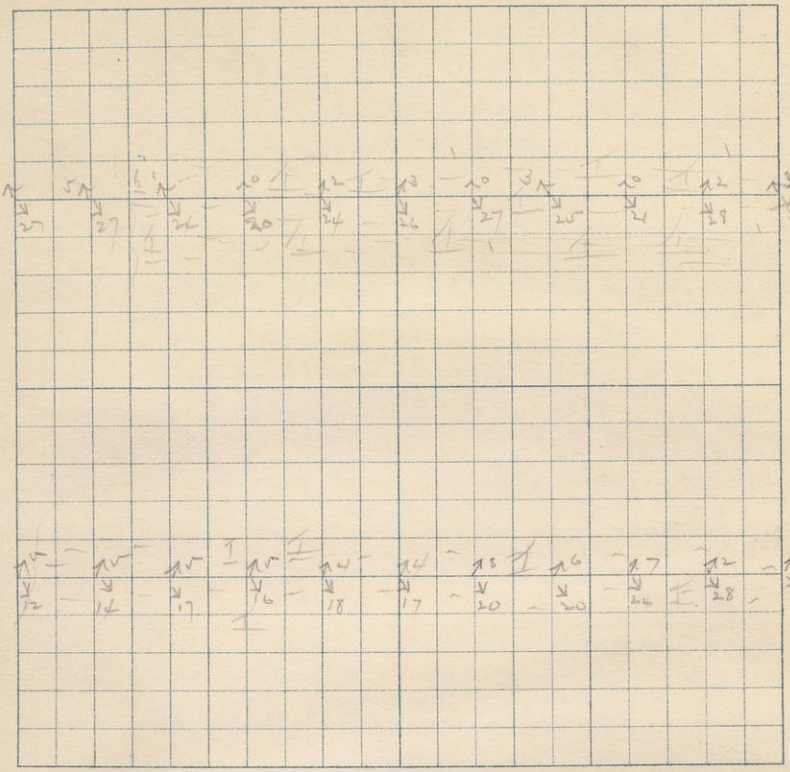
20 NW 1/4 S. 9 T. 43 R. 32



32149 225 N 1000 W SE cor 16-43-32
Greenstone schist or slate.
This is from a layer about
6 or 8' thick in the greenstone
about ledge from which came
32148. Greenstone is on
both sides just so this is
probably a squeezed dyke or
a portion of the greenstone
itself. Strike of slaty cleavage
about N 85° E.

32150 850 W 700 N SE cor 17-43-32
A.S. Greenstone schist or slaty greenstone.
Strike of cleavage here is about
E. & W. The hill from which
this came seems to be all
ledge but I could find little
in place and that was all
like specimen. Dips is
vertical.

22 NE 1/4 S. 9 T. 43 R. 32



G.S.

3215I 1100 W 770 N AE cor 17-43-32

32152 Greenstone schist and plain fine grained greenstone.

G. The bluff is mainly greenstone with the schist coming in on south side striking E & W.

Large bluff to the west is a continuation of these ledges and both kind of rock occur.

3215 3 200 N 1700 W AE cor 17-43-32

G.C.M Greenstone conglomerate(?), massive. Large bluff which I think is all like specimen.

3215 4 200 N, 950 W AE cor 17-43-32

G.C.M Greenstone

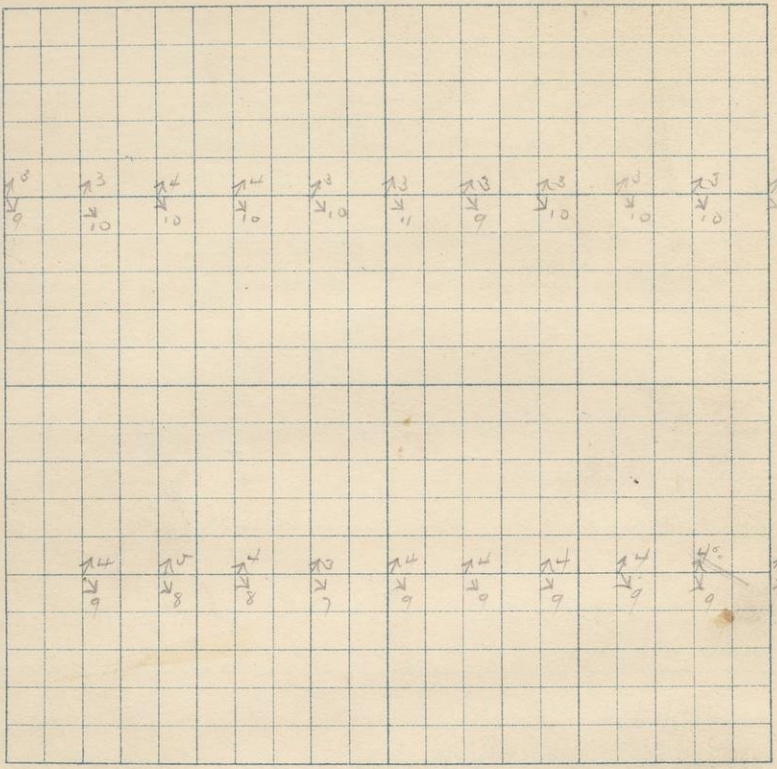
3215 5 250 N 150 W AE cor 17-43-32

G.C.M Greenstone

3215 6 250 N 150 W AE cor 17-43-32

B.S.T. Greenstone schist or slate from local layer in 32155

24 SW 1/4 S. 9 T. 43 R. 32



3215
G.C.

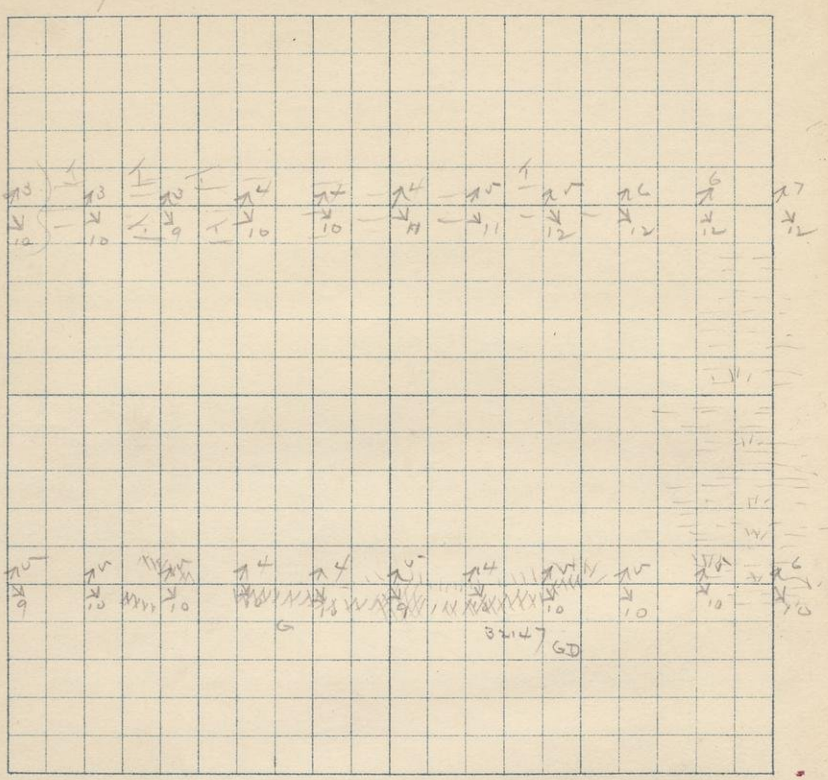
3215
G.C.

3215
G.C.

32157 1150 N - 500 W SE cor 18-43-32
Q.C.M Greenstone.
Have seen much that I can not distinguish from this spec. in sec 5-43-32 and along that greenstone belt or area, and occuring with the typical greenstone congl. Found small patch of greenstone congl
32158 (1100 N 350 W SE cor 18-43-32)
Q.C. in this bluff but could not make out any relation with 32157

32159 250 N, 500 W SE cor 18-43-32
Q.C. Greenstone conglomerate
From south slope of large bluff where is exposed large ledge of rock all like spec.
As in specimen, many small pebbles or fragments occur. Most of these are squeezed into lense shapes giving the ledge a structure. Strike of this cleavage is about E-W.

SE 1/4 S. 9 T. 43 R. 32



Dip. N 80°-85°.

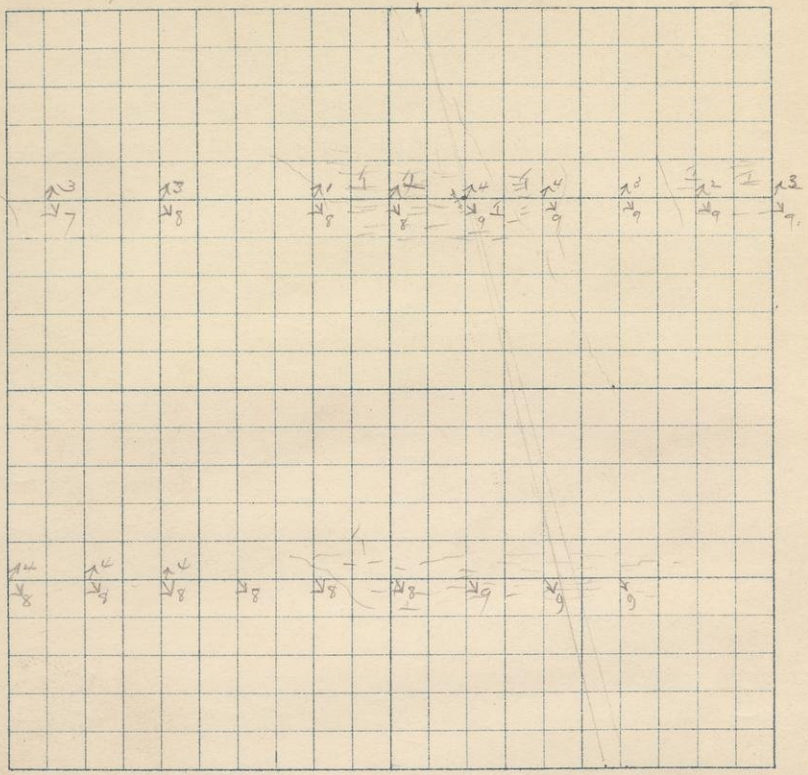
32160 250 p N. SE cor 18-43-32
G.C.M. (see page 42)
Plain greenstone — fine grained and massive — belongs I think with same class of rocks as 32159, or conglomerates.

32161 1250 N, 350 W SE cor 3-43-32
32162 1500 N, 450 W SE cor - 3-43-32
G.D. Greenstones (feldspathic)

32163 2000 N 1200 W SE cor 3-43-32
G.D. Greenstone (feldspathic)
These last three rocks are of the same kind I think and from one ledge that is nearly continuous in sec. 3. I found it each time I crossed the sec.

32164 2000 N, 1450 W SE cor 3-43-32
G.D. Fine greenstone.
(May not be a ledge)

28 NE 1/4 S. 17 T. 43 R. 32

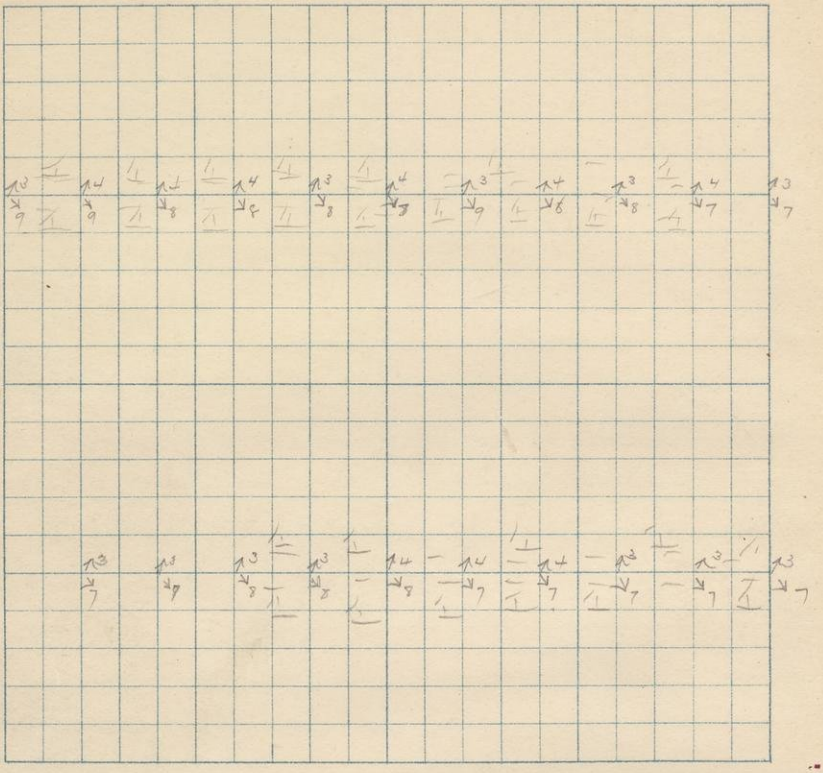


Blank Odd Pages

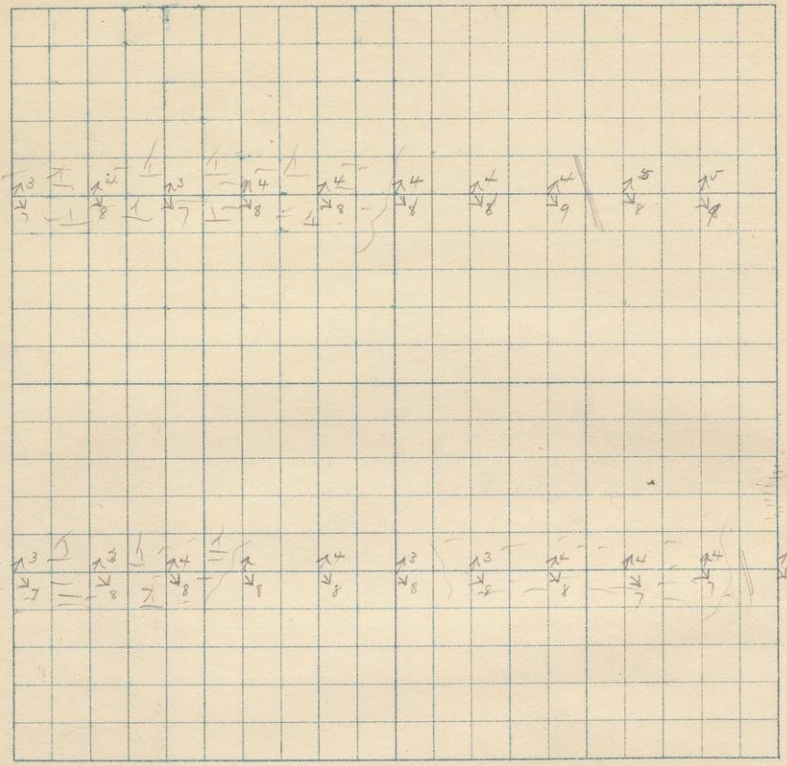
29-53

Skipped

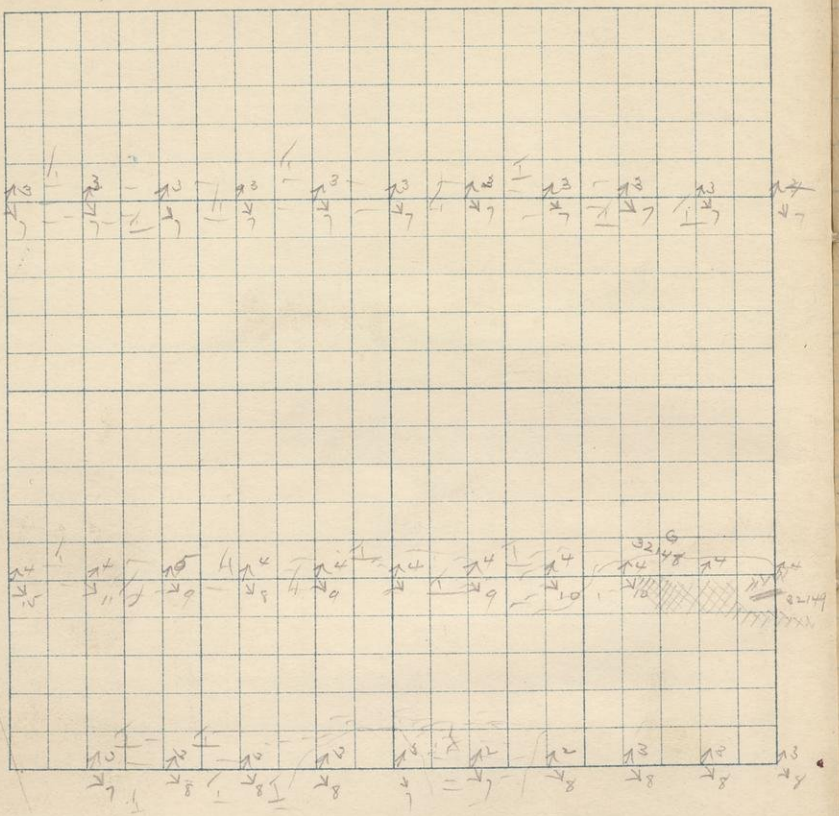
30 NW 1/4 S. 16 T. 43 R. 32



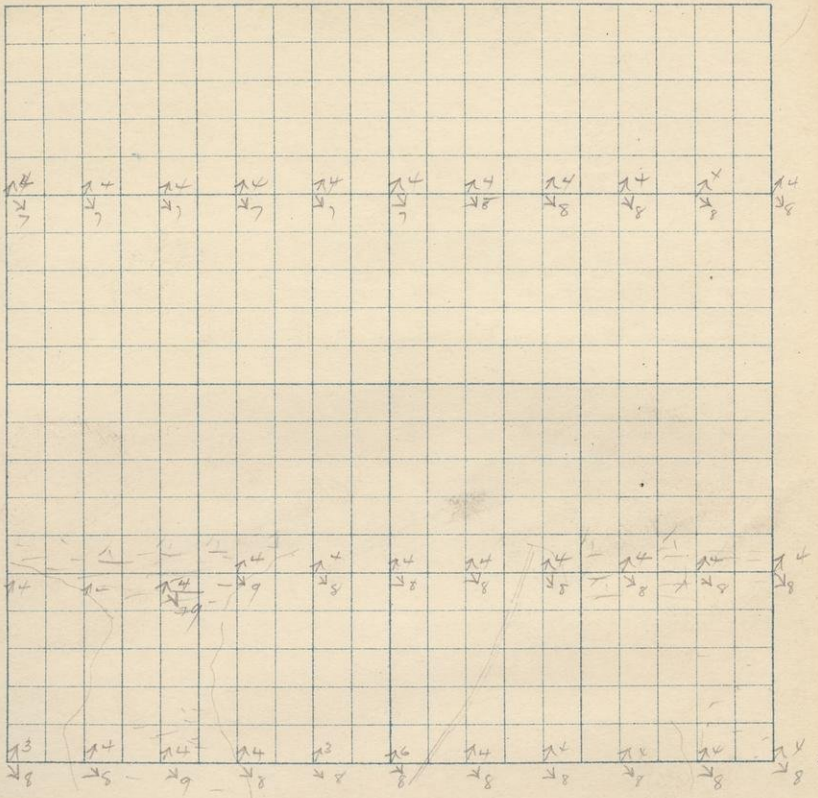
32 NE 1/4 S. 16 T. 43 R. 32



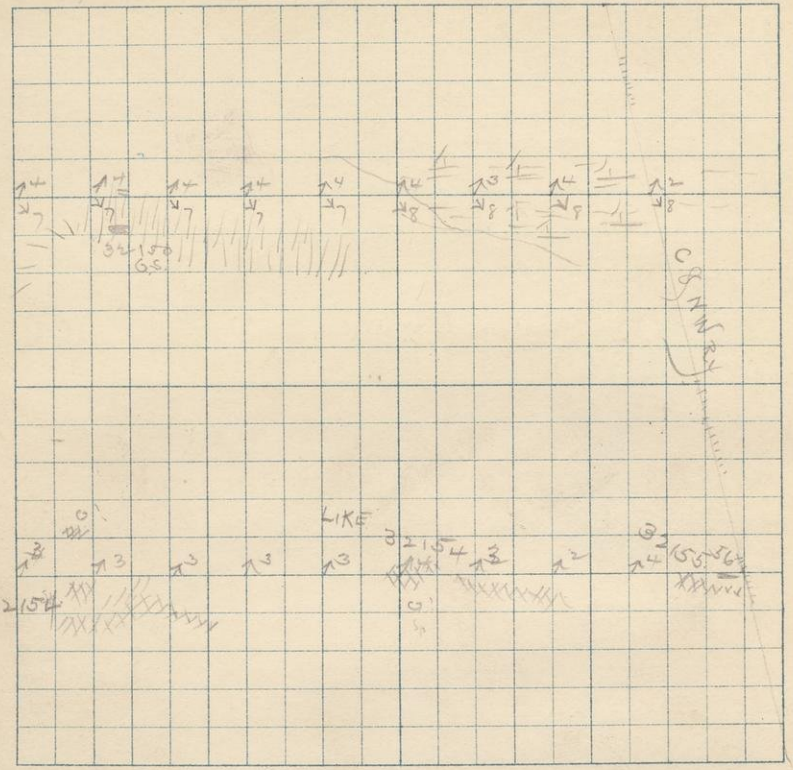
34 SW 1/4 S. 16 T. 43 R. 32



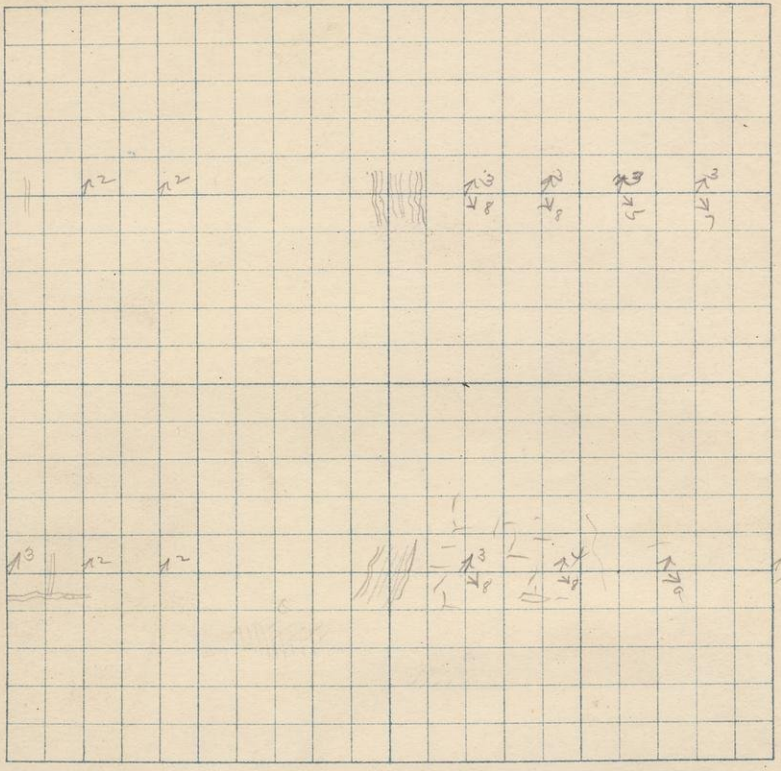
36 SE 1/4 S. 16 T. 43 R. 32



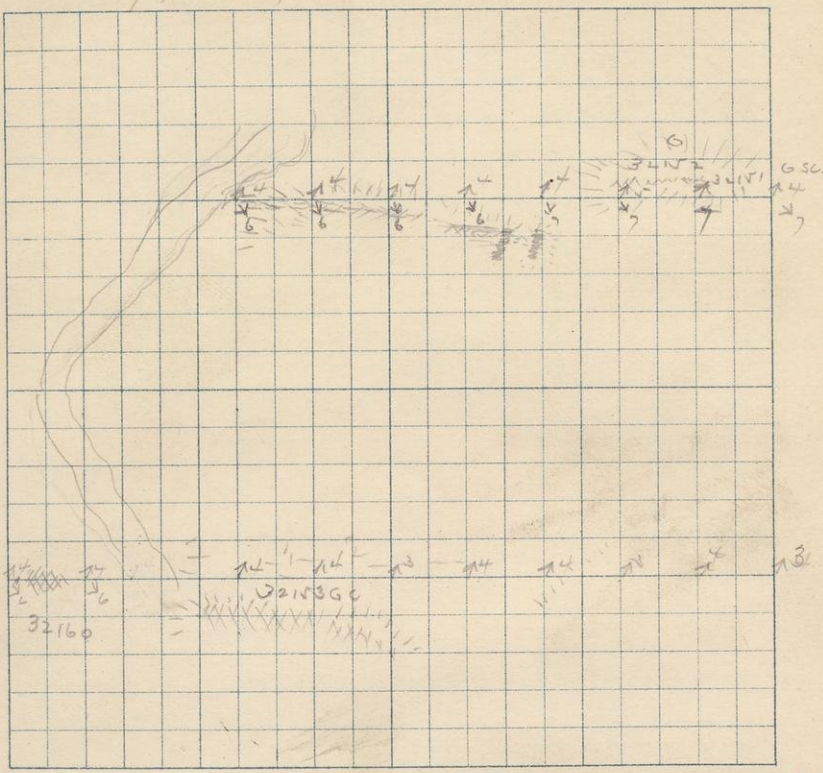
38 SE1/4 S. 17 T. 43 R. 32



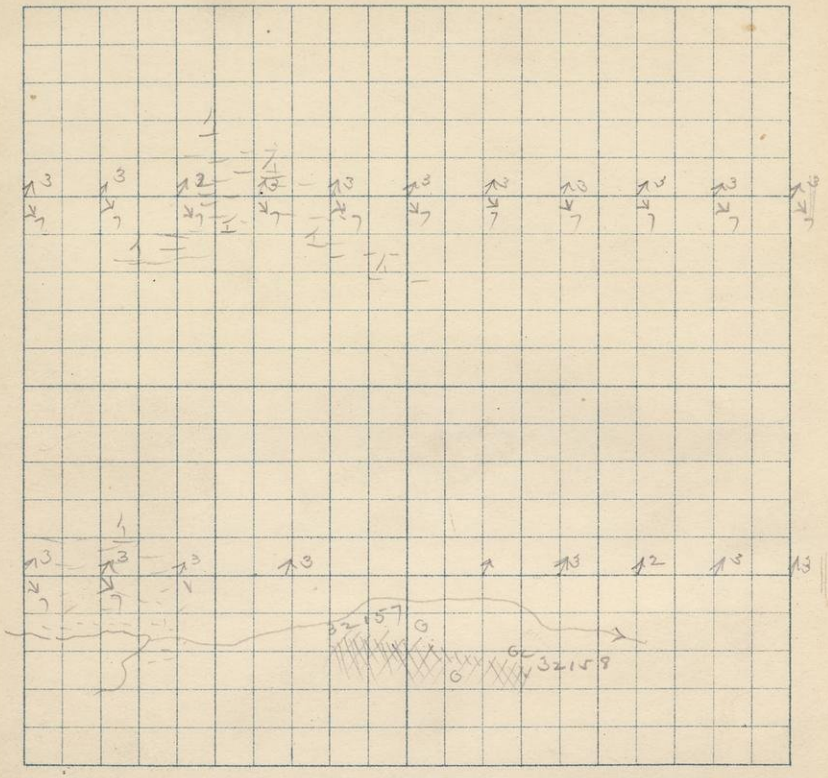
40 NW 1/4 S. 17 T. 43 R. 32



42 SW 1/4 S. 17 T. 43 R. 32

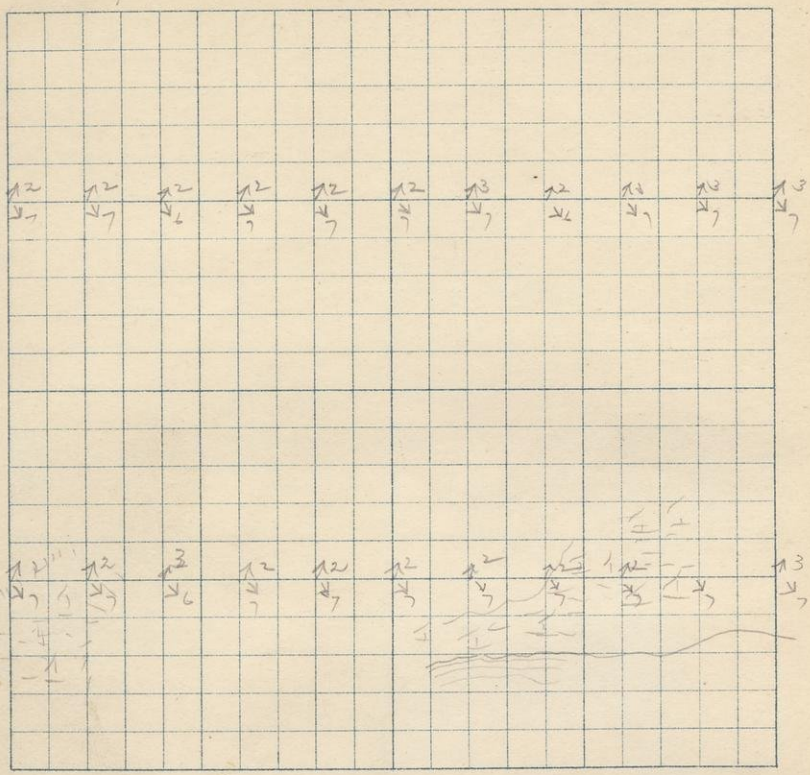


44 NE 1/4 S. 18 T. 43 R. 32

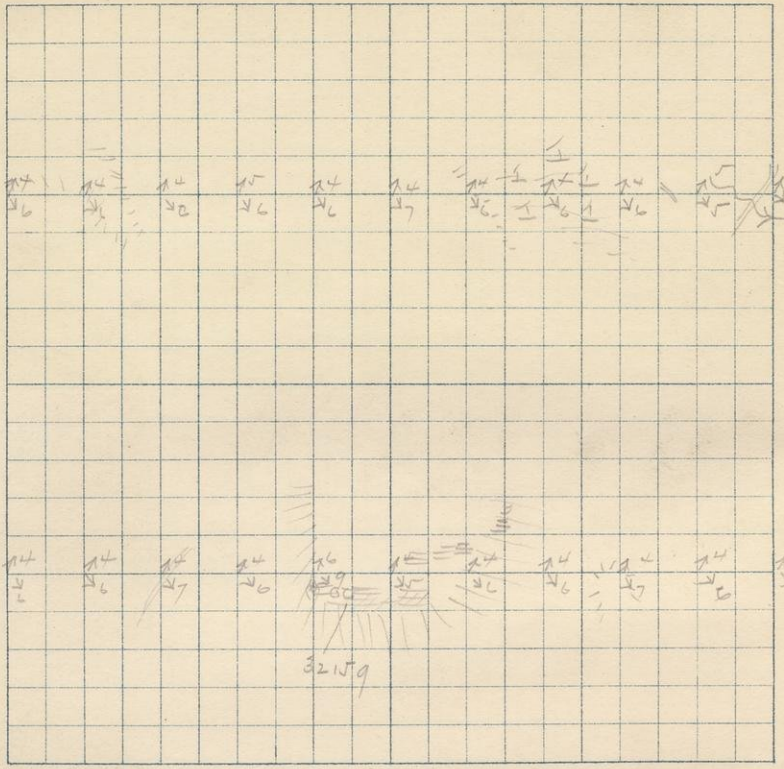


LOCATIONS shown are
100 ft. South.

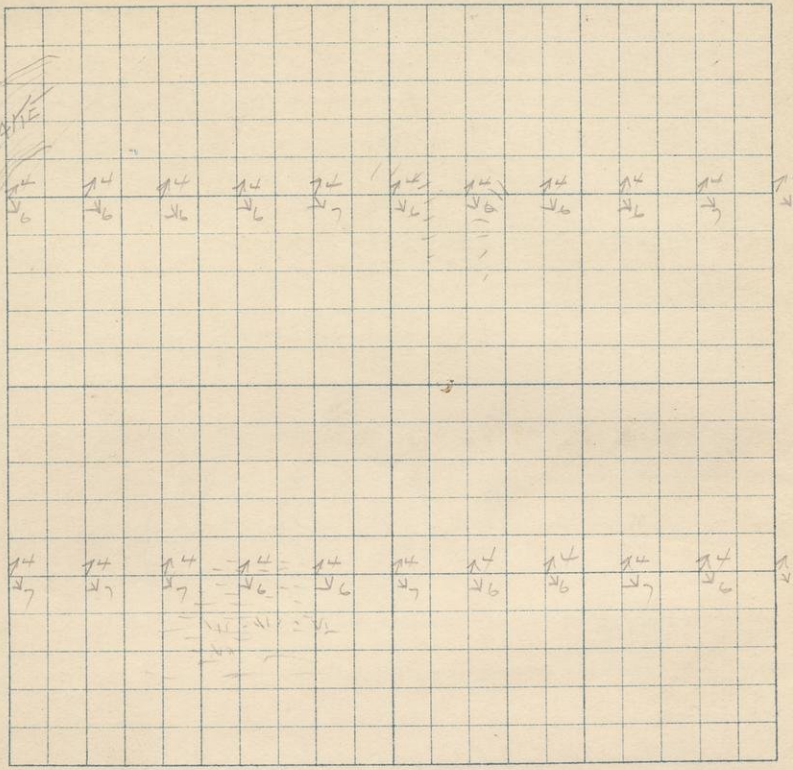
46 NW 1/4 S. 18 T. 43 R. 32



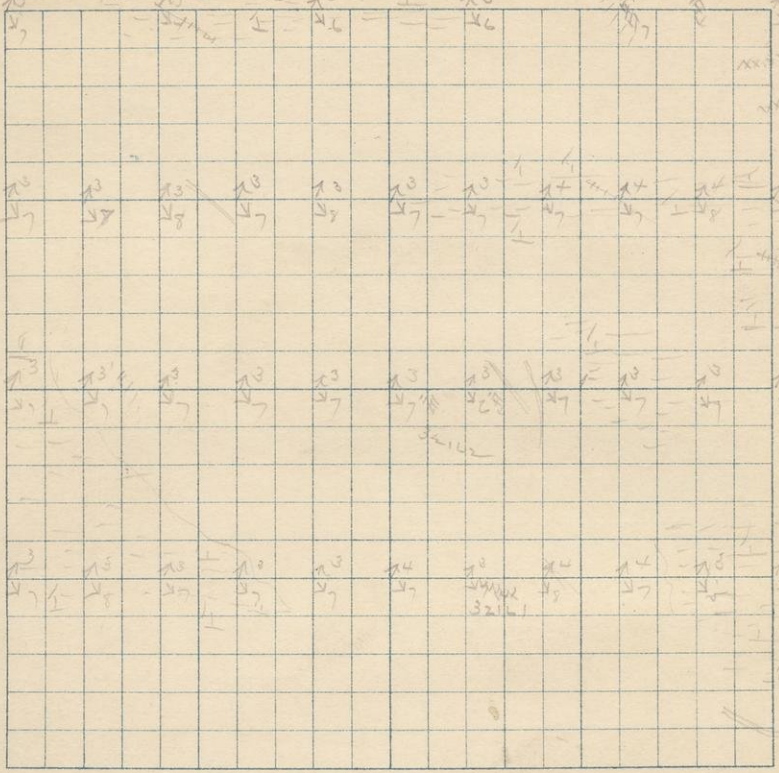
48 SE 1/4 S. 18 T. 43 R. 32



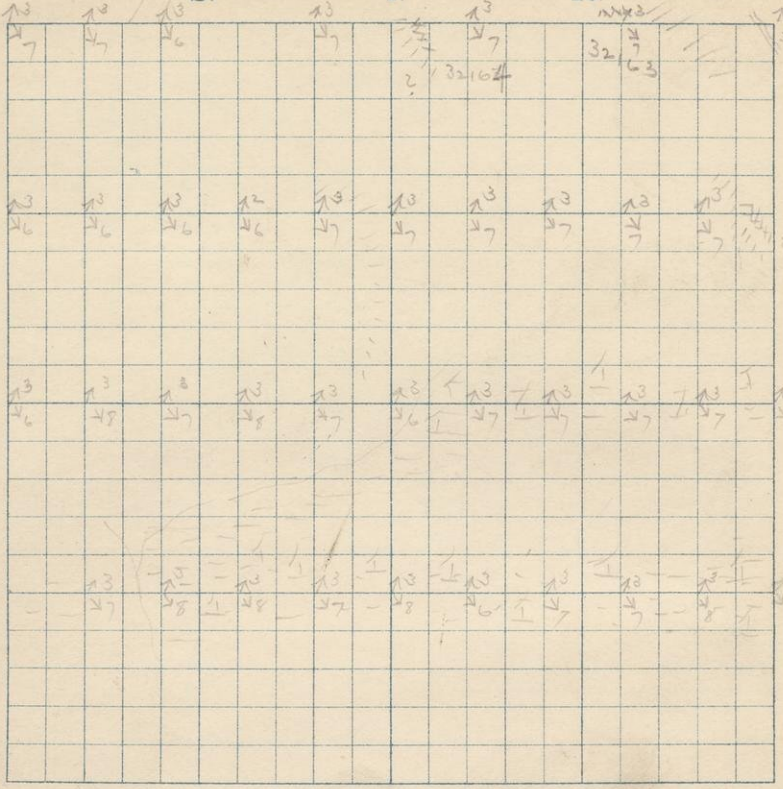
50 SW 1/4 S. 18 T. 43 R. 32



52 NE 1/4 S. 3 T. 43 R. 32



54 NW 1/4 S. 3 T. 43 R. 32

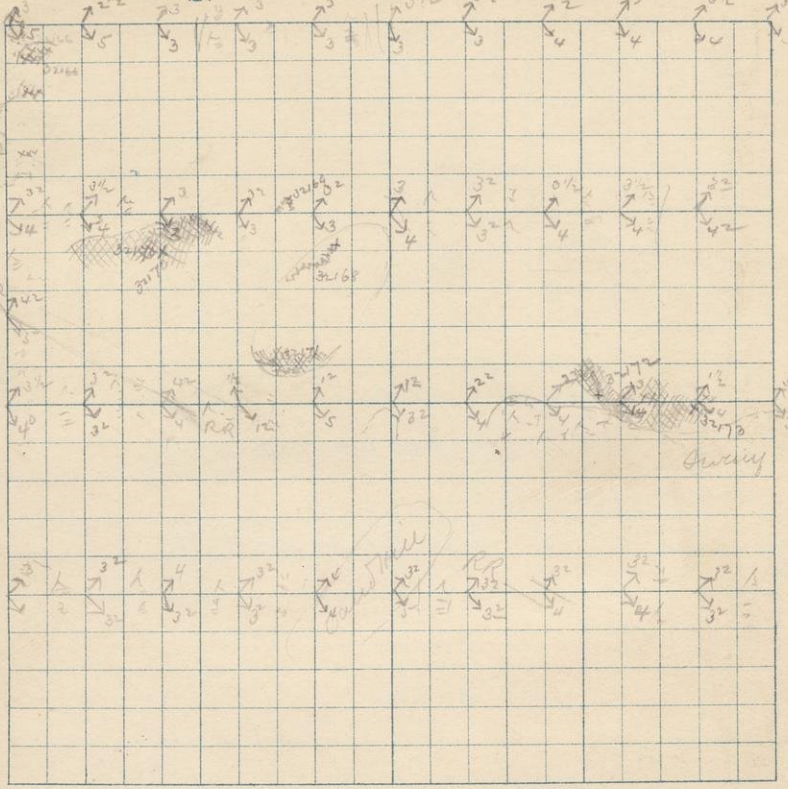


The Notes beyond
this
have been recopied
W. S. Bayley

See Book 289

56

S. T. R.



32165 150 S. N. W Cor Sec 2

32166 48 S. " " .

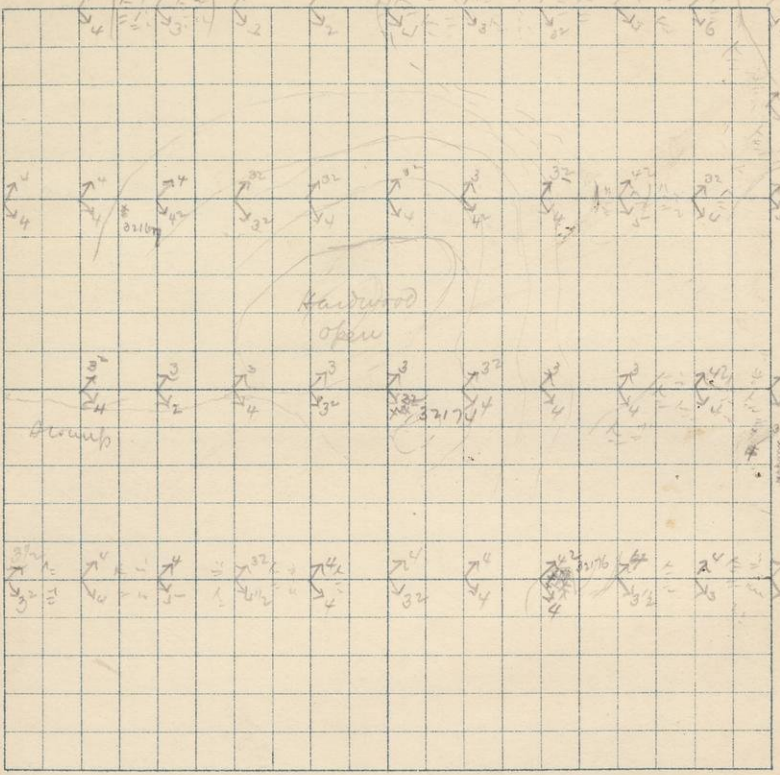
Variation 3 E. Dip 6° 11 steps E of Corn

32165 Shows diabasic structure on weathered surface.

Small bdys, same rock 48 S and 23 E.

58

S. T. R.



32167
32168
32169
32170
32171
32172
32173
32174
32175
32176

32167 250 S. 1153 E of NW Cor Sec 2

32168 308 S. 420 E " " " " "

32169 about 290 S. 350 E " " Much [illegible]

32170 Top of hill. 310 S. 200 E. Coarse grain

32171 460 S. 350 E

32172 475 S 760 E.

32173 500 S 880 E Coarse grained phase of
Same rock. Normal phase surrounds coarse
grained portion.

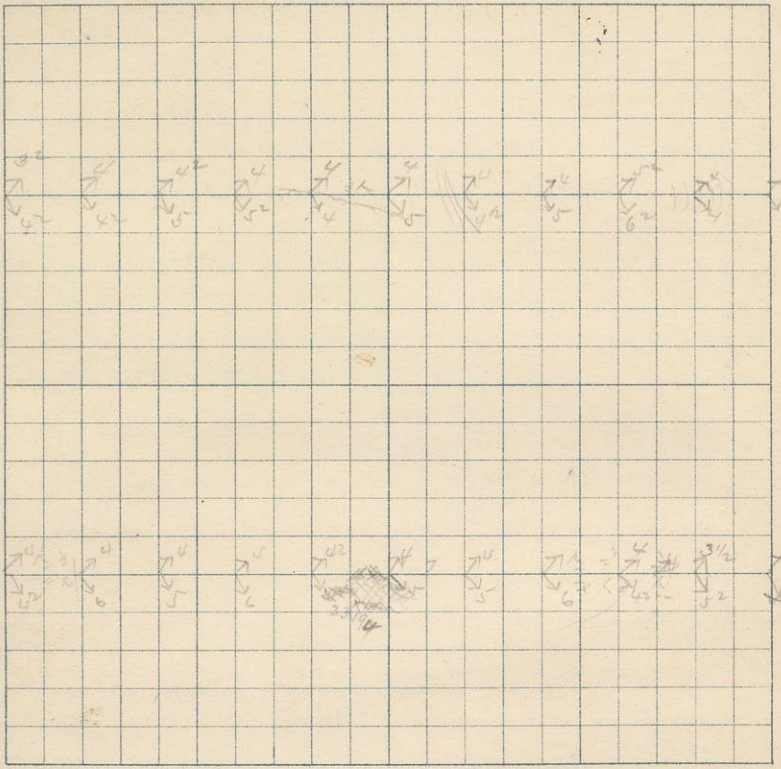
32174 540 S. 1520 E Dark question. Looks
like very basic phase of others, but
contains almost no feldspar (Hypersthenite)

32175 560 S. 1980 E Schistose dark rock like
32174

32176 Like 32174 near edge

60

NE¼ 11 S. T. 43 R. 32



32179

32178

32179

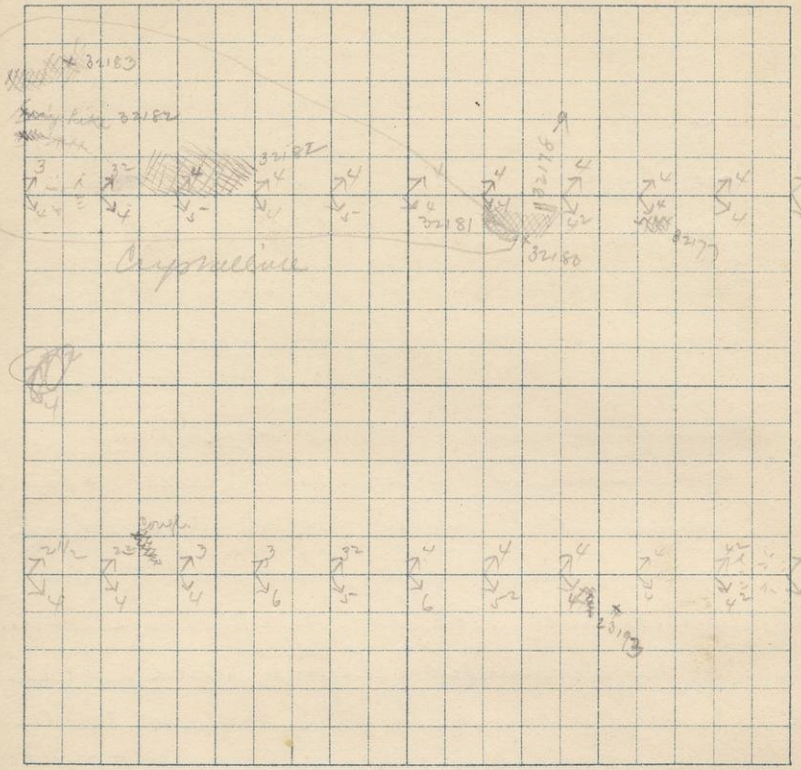
32180

32181

32181

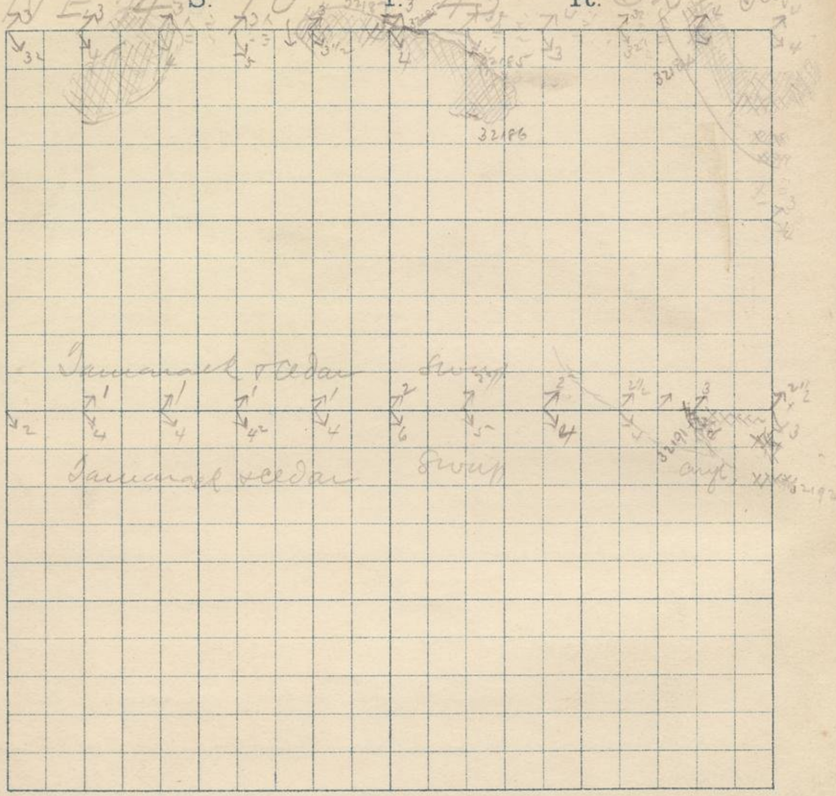
32177 800 E 280 S NW Cor Sec 11
Fine grained gray greenstone
32178 ~~700~~ 690 E 280 S.
32179 ~~700~~ 690 E 290 S
32180 670 E 310 S
32181 600 E 300 S.
Knoll as usual covered with moss, except on top toward south side where well enough exposed to show rocks.
On the north side well down toward bottom are slates (black) in which bedding planes are sometimes slightly noticeable. The slaty cleavage strikes 10° N of W and dips high to north, while the small portion of the bedded material seen dips south at about 40-50°.
Just south of this is the fine grained greenstone slightly schistose (32179)
On south side of hillock the fine grained rock is cut by veins etc, and is quite chunky (32180)
32181 At the west end of hill on south side is a coarse grained phase of the gray rock in which diabasic structure may be noticed. As many as could find it grades into 32180

62 NW 1/4 S. 11 T. 43 R. 32



32182 300 W. 200 S. Fine grained but not dense
gray rock forming entire mass of big hill.
32183 From S.E. edge of hill at corner
Dark crystalline greenstone 40 S. 60 E of
corner.
32184 West side same hill, well down. 1900 E of
NW Cor. Fine grained dark greenstone
32185 50 S. 1600 E. NW Cor Sec 10. Slate
on north side of bluff. Several layers
of black slate facing the hill. Bands are
distinguishable in it and they seem
to dip S at a high angle (85°). but could
not determine position. South of this is
the dense blue greenstone and South
32186 of this a band of conglomerate about
40 paces wide and ending as a sheer
cliff at 115 S of line
32187 Fine grained rock at 1000 on north west
end of hill.
Another hill at 1200 W. is composed
of the same fine grained gray rocks
as that of hill at 1000. This hill
extends down beyond the N. 1/4 post of 11.
but no rocks are exposed on it near
the 1/4 post until reach 50 paces W. where
it ends as a 20 ft precipice running N.W.

NE 1/4 S. 10 T. 43 R. 32



Shores by 50 paces further S.

32186

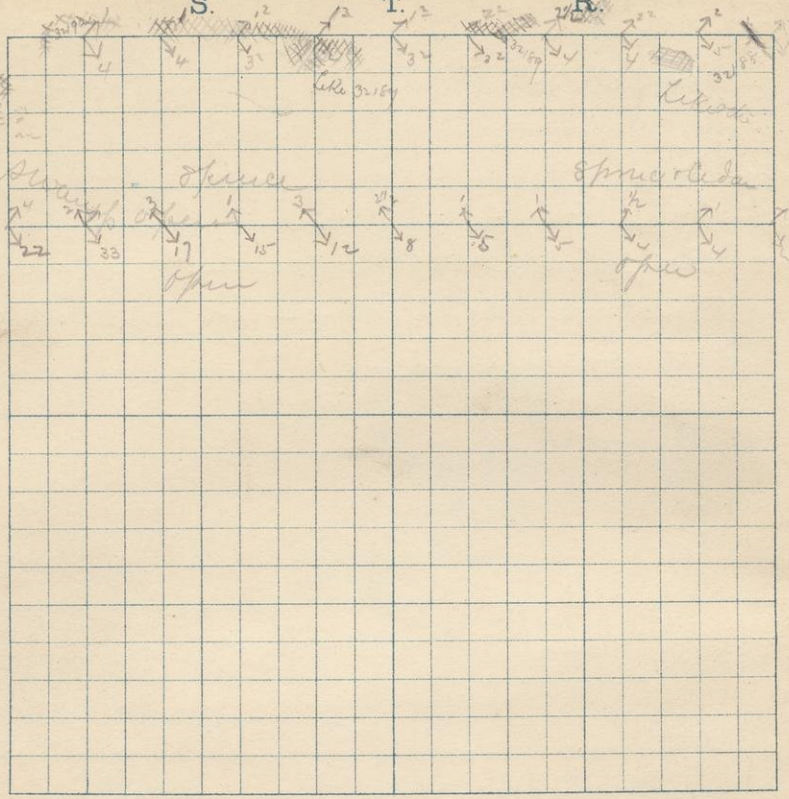
32186

32188 is from the precipice 950 W of NW Cor
Sec 10

32189 Fine grained greenstone from small
ledge 650 E of NW Cor Sec 10
Other ledges of the same rock are lo-
cated on map page 66 but were
not specimened.

66 N.W. 1/4 10 43 32

S. T. R.



Shown by 500 line instead of 250

32190
32191
32192
32193
32194

32190 is from hill at 50 E of NW Cor 11
It is a dark schistose rock looking like Cong.
From this corner went 500 S. 1 mile
East 250 S and 7 miles East to 250
N of E 1/4 post 11.

32191 1900 W 500 S. of NW Cor 10. Dark
gray phase of fine grained rock
West side of hill.

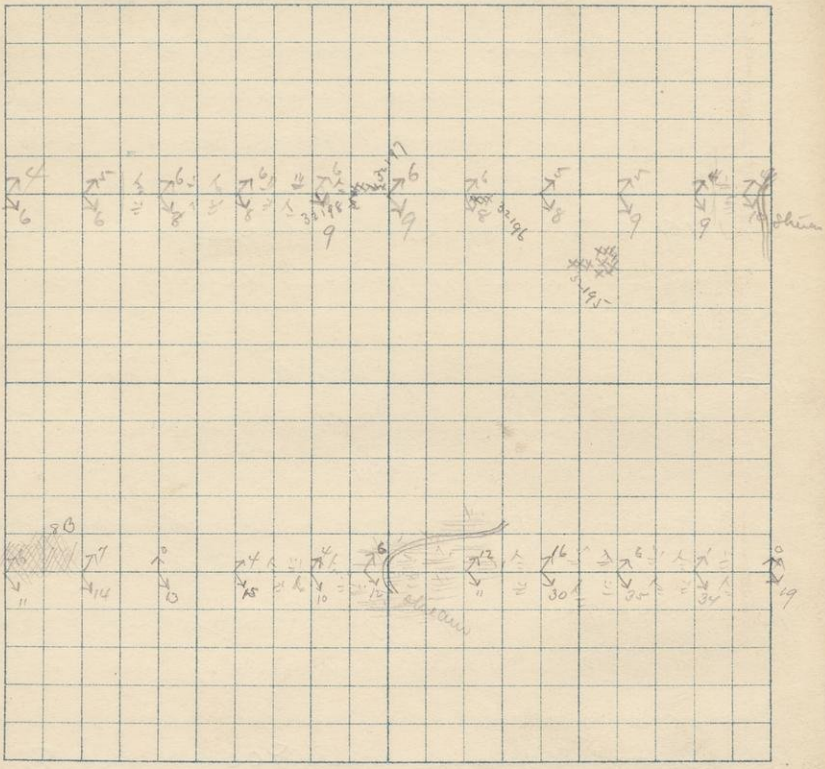
32192 2000 W. 600 S. of NW Cor 10. Conglomer-
ate, from south side of same hill from
which came 32191

Another small ledge of conglomerate is
at 700 S. 150 W of NW Cor Sec 11

32193 Fine grained gray rock, small ledge
at 500 S. 750 E of NW of 11.

32194 Coarse diabase from 800 S. 1450 E of
NW Cor 11. High hill with much
rock in big ledges.

68 SE S. 11 T. 43 R. 32



32195 From top of small hill near eastern end of a big narrows also rung ridge bare on south side. The rock is the fine grained clinkey material containing here and there whitish weathering patches, so as to resemble a conglomerate.

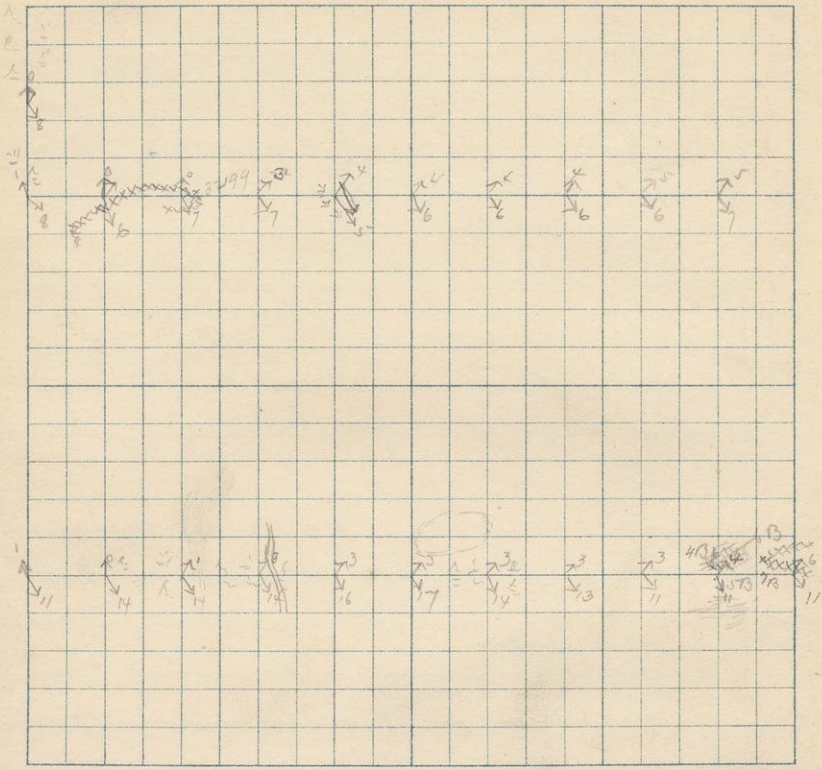
32196 From north side of same hill at 395 W. Spec. Here Schistose, but little further back in same hill the rock looks like 32195.

32197 10 paces W of tally 5 on north side of hill little face of rock whose weathered surface and fresh fracture shows small ▭ feldspars in fine-grained groundmass

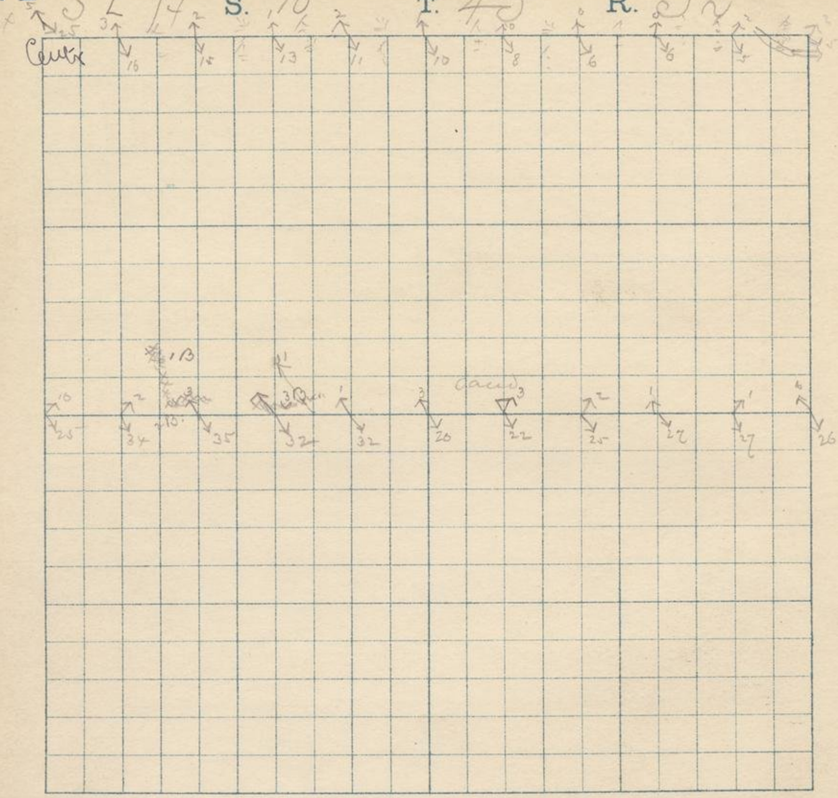
32198 Further ~~west~~ on same hill 557 W. The rock is amygdaloidal with small black amygdules

32199 Conglomerate forming ~~ledge~~ hillock so covered that could not get strike or dip. Strike appears to be E of W.
At west end of knob the schistosity is al-most vertical dipping very high to north.

70 SW 1/4 S. 11 T. 43 R. 32



 SE 1/4 S. 10 T. 43 R. 32



Tally 10 – 40 steps N of 1/4 line.

1 B.
32787

2 B
32788

3 B
32789

4 B
32790

5 B
32791

6 B
32792

See Book 289 for following

1 B. 32787 — 430 S. 140 E of Center Sec 10. Fine grained gray rock from west side of hillock

2 B 32788 — Further South on same face the rock becomes conglomeratic, showing white weathering fragments, which on fresh fracture look like 1 B. The fragments average about an inch in diameter, and many of them are rounded.

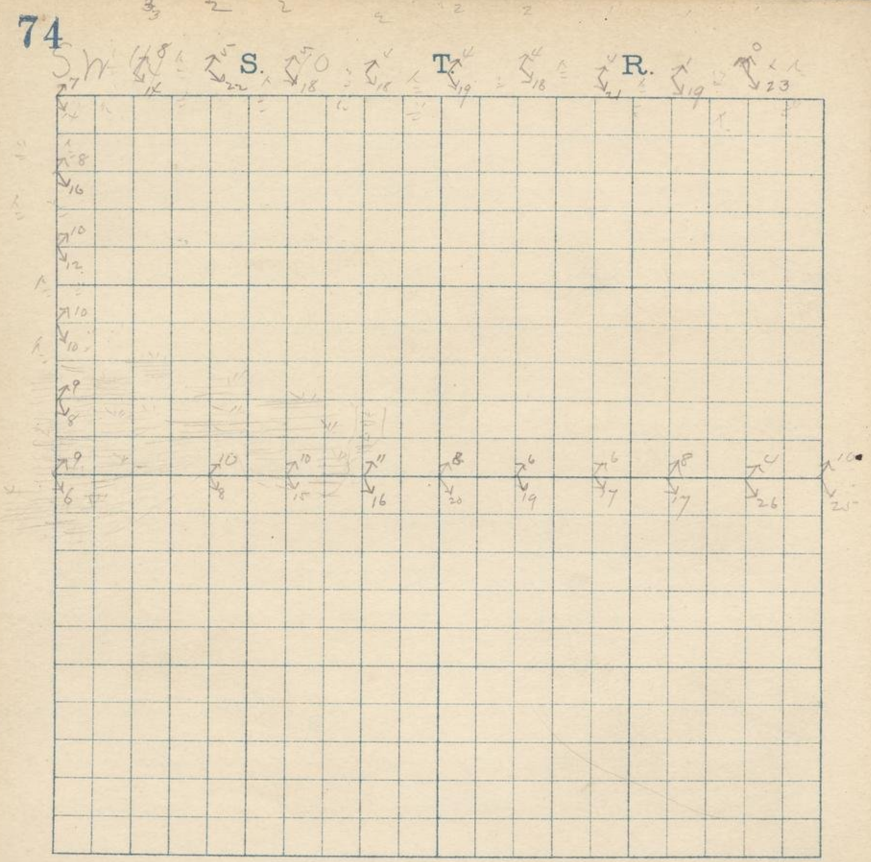
3 B 32789 — At 300 E the conglomerate is again seen in small ledge. It is here amygdaloidal with amygdules of jasper (?) and black substance. Slight strike bhe 10 S of W and dip nearly vertical but to North

At 900 E of W line Sec. 10 is a long hillock some 30 paces wide from N to S. On the north side of the hillock the rock

4 B 32790 — is a massive purplish gray greenstone and on the South side the same rock spongized with irregular cavities occasionally hollow, but more frequently filled with

5 B 32791 — calcite and dark material

6 B 32792 — About 20 paces by 5 B the fillings are all drawn out like elongated amygdaloids, whose banding gives opportunity for determining the dip of the rock as high -



1 40 steps N of 1/4 line

2 50 " " " " "

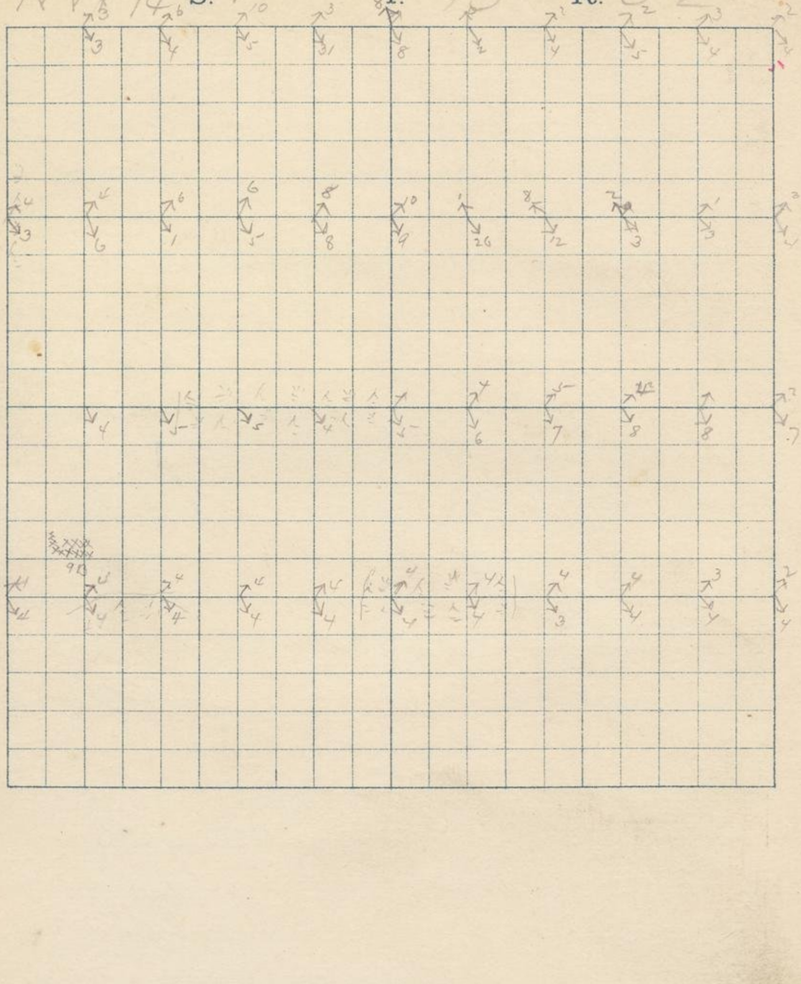
3 Line – pacing 100 short – All 100 gained between Center of Sec. & 1/4 post. – 67 steps N

seem 75° W.S.

7B Iron Co end another hill 950 E of W line sec
32793 11. Showing fines on weather surface when amygd. rocks

8B Fine grained porphyry rock N. of amygdaloid
32794 facing north side of hill. This rock borders
amygdaloid on north side all the way and
seems to grade into it.

 NW 1/4 S. 1 T. 43 R. 32

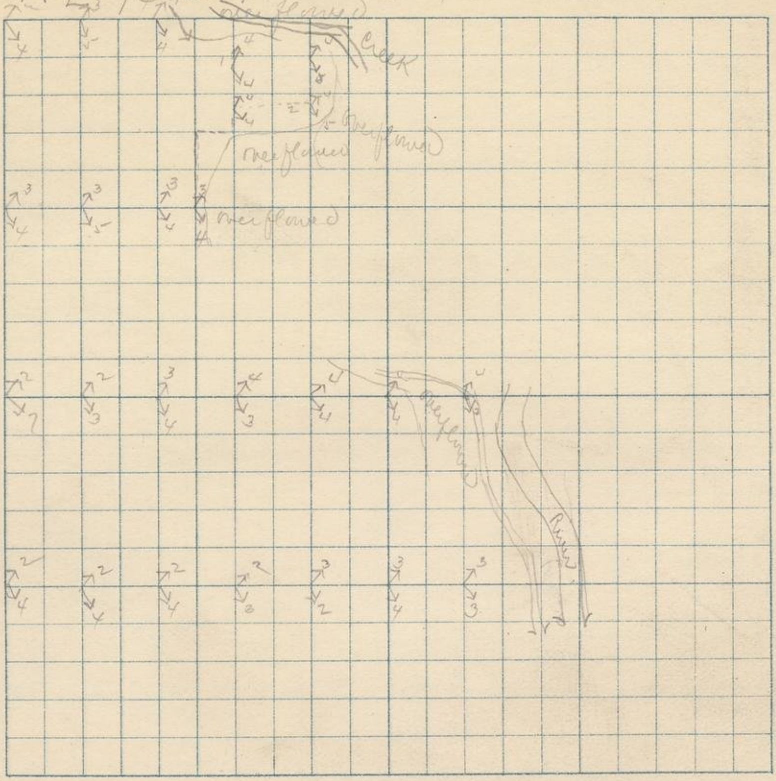


9 13

32795

9 B 80 E 690 S of NW cor sect. Lime kiln
32795 of fine grained Diabase

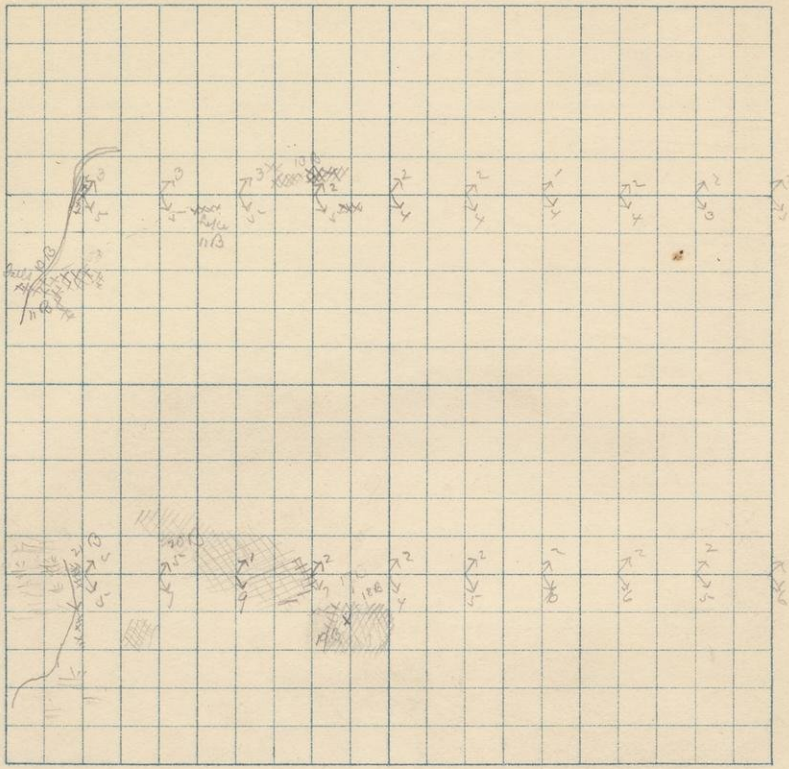
NE 1/4 S. 1 T. 43 R. 32



1 67 S. of line followed.

2 110 S. " "

80 NW 1/4 S. 12 T. 43 R. 32



10 B 32796 375 S. 10 E. of NW. Cor Sec 12
Schistose crystalline basalt, where schistose it strikes to S of W, dips nearly vertical

11 B 32797 Darker more massive phase. May be a dyke in 10 B but believe rather a massive phase of it

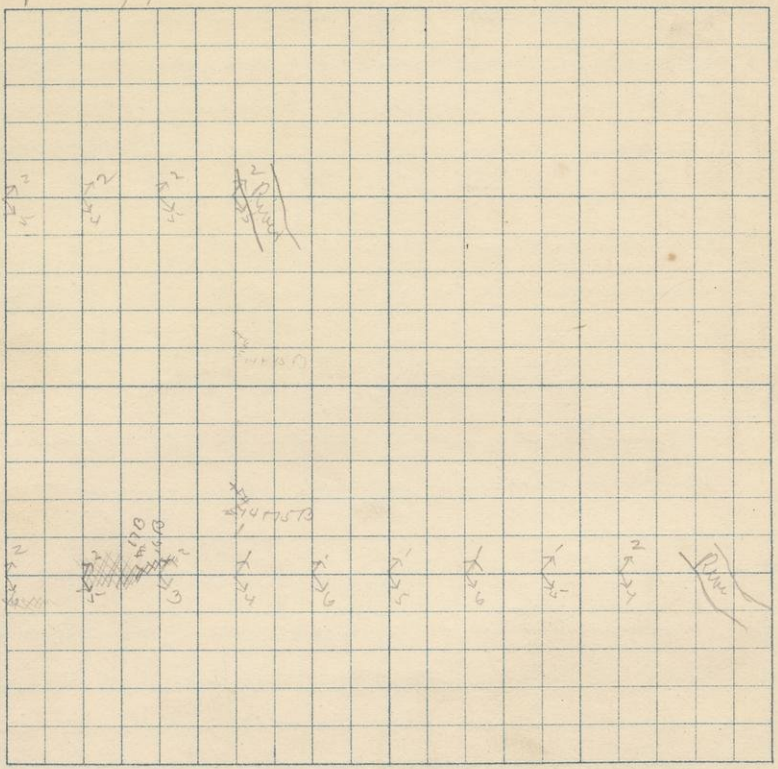
12 B 32798 From side of creek at 90 E. 250 S of NW Cor., on side of high sand ridge. Coarse grained light colored gabbro like rock

13 B 32799 210 S. 285 E. of NW cor Sec. Light coarse cryst. diabase. Probably phase of 10 & 12 B.

14 B 32800 15 B 32801 At 650 S. 1200 E of NW Cor. small ravine around ledge which shows two rocks, 14 B a fine grained schistose greenstone and 15 B a red weathering pink granite looking rock. The latter and the former are in contact as though the granite were a dyke in greenstone. Both specimens from near the contact.

16 B 32802 Fine grained greenstone 1200 W. 740 S. of NW Cor.

82 S.E. 1/4 S. 12 T. 43 R. 32



17B
32803

18B
32804

19B
32805

20B
32806

21B
32807

22B
32808

23B
32809

17 B
32803
Coarse phase (Diabase) a little further onto ledge (up hill).

18 B
32804
1450 W. 860 S. Coarse gabbro-like light rock forming considerable knoll.

19 B
32805
Dark schistose phase of 18 B. Top of hillock

20 B
32806
Basic beautifully crystallized phase of 19 B. The entire nunatak here is composed of rock like 18 B, except at west end where the dark constituents are more prominent and feldspar less so.

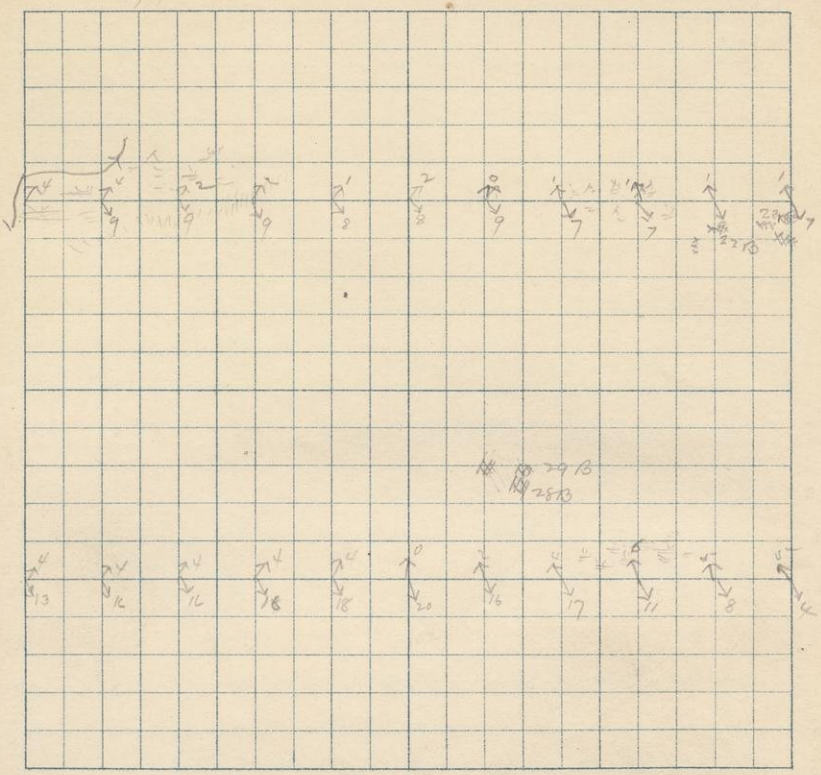
21 B
32807
100 E 750 S of NW Cor Sec 12.
Coarse grained rock like others, slightly schistose with holes in weathered surface and showing many quartz grains etc.

---

22 B
32808
Two small ledges of schistose greenstone in small elevation mainly covered with sand. The rock seems to be schistose amygdaloid, with schistosity striking about E & W and dips high to S.

23 B
32809
A little further East on the same line, about 950 E. 1275 S. small ledge of fine grained gray which ~~like others~~ is also more or less schistose, but apparently

84 SW 1/4 S. 12 T. 43 R. 32



24B
32560

24B
32811

26B
32812

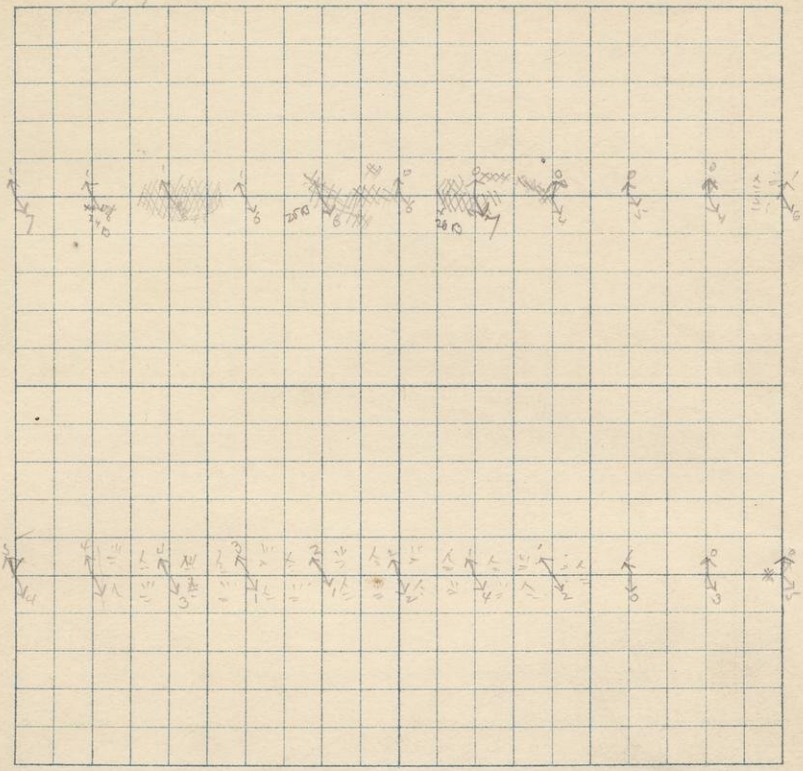
much more massive than others

24 B Another small ledge of fine grained rock
32810 on south side of rough hill, all covered
but probably composed of same rock
1760 S. 1100 E. of NW Cor.

26 B W end very rough hill of fine grained
32811 gray rock 1400 E of 1750 S.

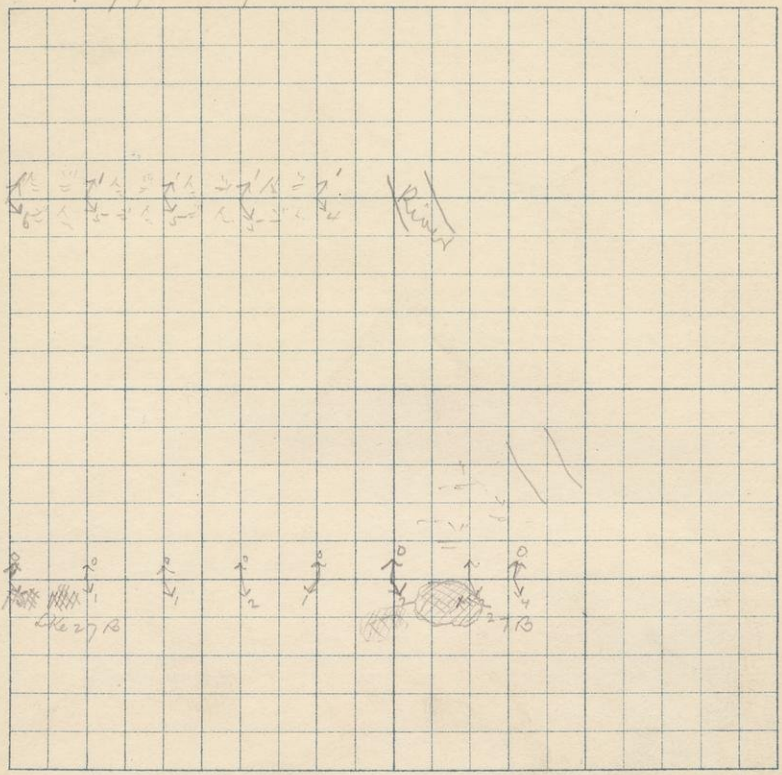
26 B Same rock West and more easterly hills
32812 (hills seem to run E to W)
1600 E. 1760 S.

86 SE 1/4 S. 12 T. 43 R. 32



on north side of dam

88 SW 1/4 S. 7 T. 43 R. 31



27 B
32813

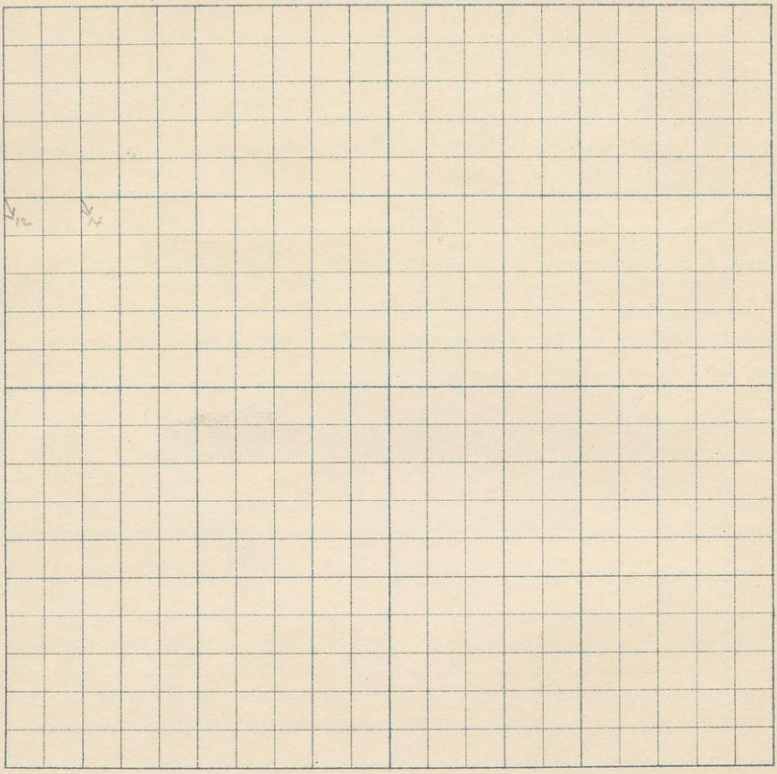
28 B
32814

29 B
32815

27 B 32813 The hill at 1750-1800 S. 500 E of NW Cor Sec
7 are of the fine grained gray rock -
very massive in fresh as a rule, but
here and there weathering into a soft
brown sandy rock.

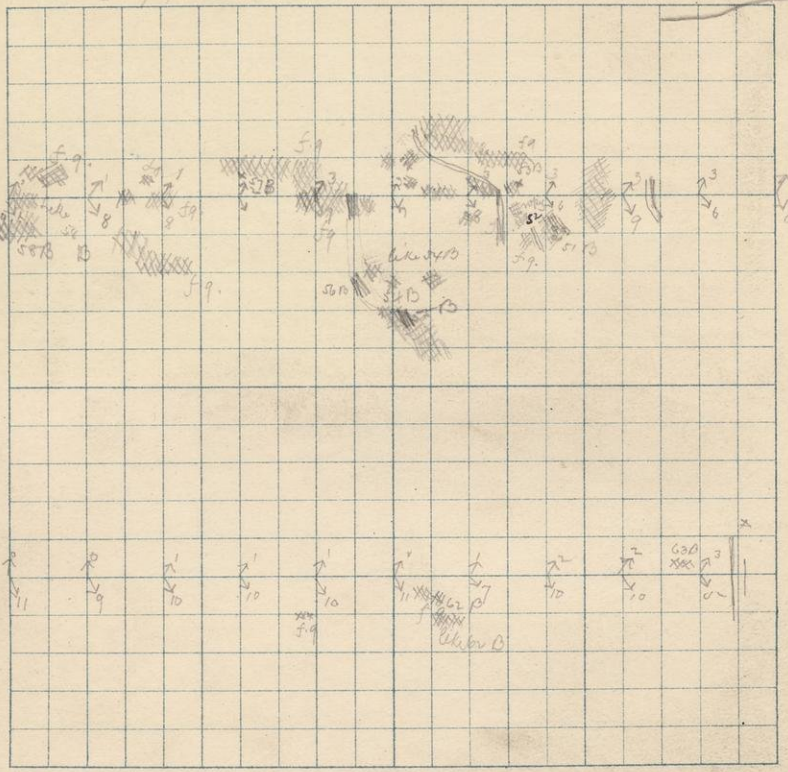
28 B 32814 Conglomerate striking as nearly as could tell
20° N of W.
North of this a few paces is a schistose amyg
29 B 32815 daloid with strike of schistosity same as
that of Conglomerate
1600 S. 1650 E of NW Cor Sec 12, South
side of hill.

90 NW 1/4 S. 13 T. 43 R. 32



On Work

92 NE¼ S. ~~15~~ 16 T. 43 R. 31 River



+ Stuck line at 1940.

57B 32817

52B 32818

58B 32819

54B 32820

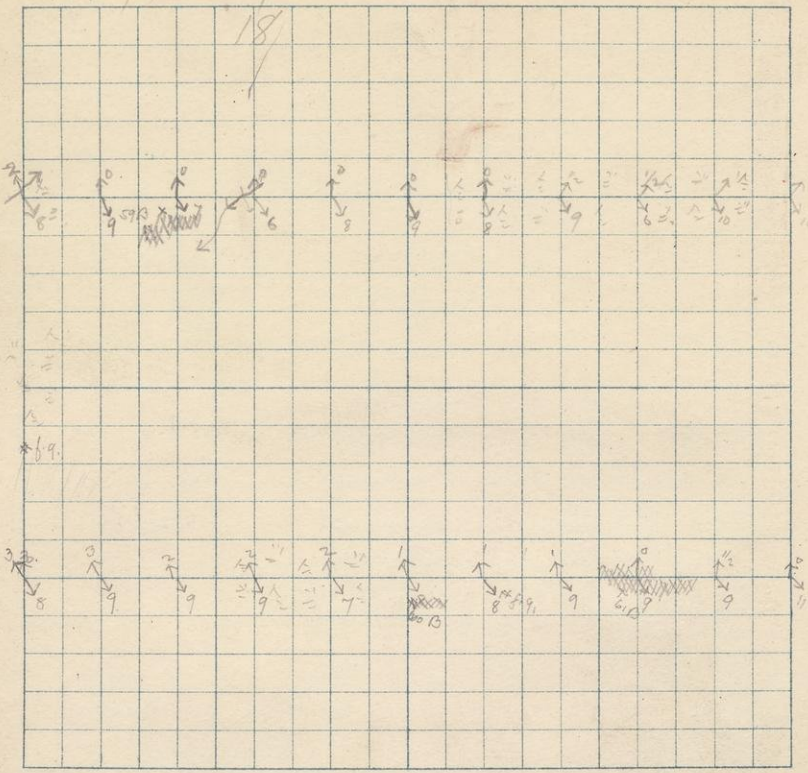
At 250 S. 210 W. begins a knob of the
fine grained gray rock
At 290 W. 290 S. south of the fine
grained greenstone, that is only a few
51 B paces north, in same ledge, is the cong-
32817 lomerate, which here seems to be grad-
ing into the fine grained rock
Just west a few paces is the fine grained
rock, with what [illegible] calls the ropy
structure
The fine grained is the predominant rock
here, a small ledge at about 320 W. 290 S.
has the ropy structure and contains angular
52 B other fragments, one of slate 52 B
32818

53 B From 250 W. 250 S. is a phase of the fine
32819 grained rock that is finely crystalline

On west side of road at 190 S. 465 W is a small
ledge of greenstone, on west side of which is a line
exposure of conglomerate,
54 B Crystalline phase of gray rock 400 S. 600 W.
32820 In the same ledge about 10 paces S E. is
a narrow exposure of slates striking
N.W. and dipping about vertically. Tried
to trace N.W. but could not. At 370 S 510

(see p 103)

94 NW 1/4 S. 18 T. 43 R. 30



30 B
32816

31 B
32817

32 B
32818

33 B
32819

34 B
32820

35 B
32821

On north side of dam of Michigamme are there rises a high bluff on whose south side 500 E. 70 N of N ¼ post

30 B 32816 Sec 18 are banded rocks (30 B) striking 45° N of W and dipping vertically. There are only small veins of quartz and contain clusters of same mineral on and calcite joint planes.

North of this the main face of cliff is almost perpendicular showing dense

31 B 32817 rock, slightly schistose but without

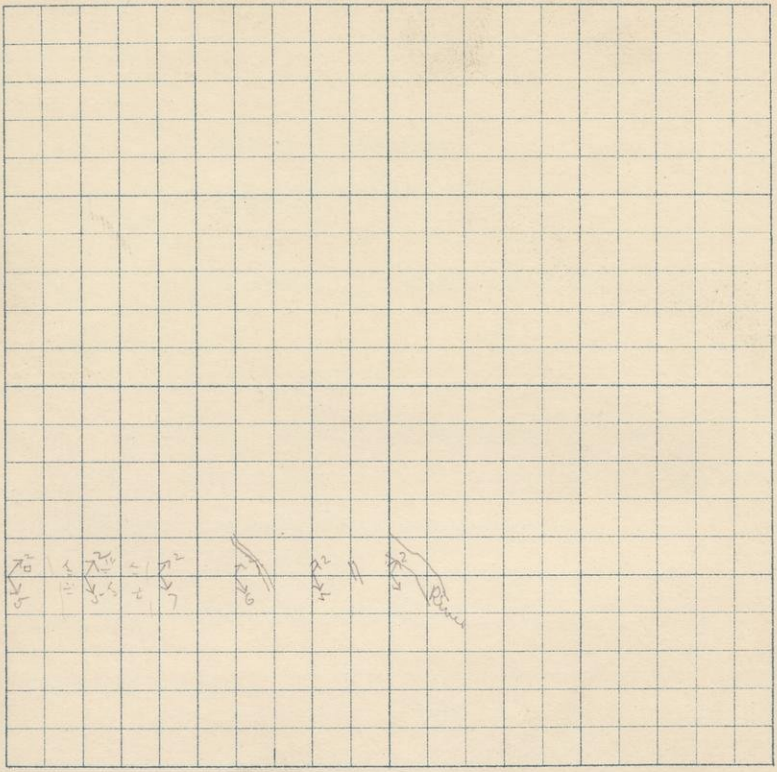
32 B 32818 well marked bedding planes. The material of this seems to be not unlike that of 30 B tho bedding is very ~~not very~~ obscure.

33 B 32819 Dark green rock weathering brown. Looks like dyke material, but cannot find but that it grades into 31 B.

34 B 32820 From 540 E, well up on bluff. This looks crystalline, but seems to grade into others further west.

35 B 32821 A cliff further east, massive fine grained rock cut up by cracks etc, so that the weathered surface looks not unlike conglomerate.

96 NW1/4 S. 14 T. 43 R. 31



36 B
32822

37 B
32823

38 B
32824

39 B
32825

40 B
32826

41 B
32827

42 B
32828

36 B 32822 640 E. 10 N. Here about ½ way up cliff. the rock again gets banded but the bands though regular for short distances are faulted by small cracks. Banding plain in weathered surface but not so in hand specimen. Specimen from western edge of the banded rock.

37 B 32823 From flat ledge 770 East 70 N. Not unlike others.

38 B 32824 Seems like a fine grained diabase

39 B 32825 Northernmost end of dense crystalline rock in East end of cliff at 785 W, 140 N. Cut by red feldspar veins

40 B 32826 Banded rock, looking like greenstone and chert. Only small pieces among about 8 sq feet under root of tree. Strikes 10 E of N. May be changed slightly in position from its original.

At 800 E went north to 250 N. then west uphill finding banded rocks again at 675 E. 250 N. These are on or near top of hill and strike 15° E of S.

41 B. 32827 dipping at this point about 85° E

But this high dip to East may be due to close contact with 42 B since

42 B 32828 only 3 ft of 41 B exists here

Blank Even Pages

98-102

Skipped

43 B 32829 200 N. 625 E of the 1/4 post 18. Fine grained gray.

44 B 32830 " 250 N. 570 E.

Most of the rock in W½ of the hill is the fine grained material dense and uniform structure.

45 B 32831 At 450 E. 180 N of ¼ post it is slightly amygdaloid

At 450 E 275 N. another small patch of bedded rock striking 20° E of S. on side of fine grained dense rock.

46 B 32832 Well banded green & white rock striking N10 E of S and dipping almost vertical at 425 E. 235 N. on west side of ledge

47 B 32833 Medium grained eruptive at 360 E 250 N of ¼ post

At 320 E, 235 S. another patch of the banded rock that here strikes 45 E of S and dips at 85-90 S.W. It is cut off in the strike by 47 B.

48 B 32834 At 100 E. 250 N, is a large ledge

49 B 32835 of the banded rock. This dips at a high angle to the W. To the west the schisting or banding begins to become distributed, resembling flowage

accumu
in an eruption, included fragments of itself and many of the fine grained porous rock (49 B). Still further to the west of this ledge the fragments get smaller and more frequent until they become a

50 B 32836 well marked fine grained conglomerate", which becomes even more characteristic further down the hill

At 520 N. 350 the cryst. rock like 56
B is amygdaloidal, with black & spheroid
black amygdules.

West is another exposure of slates dipping
56 B 32842 about 80 S.W. and striking 40 N of N.
57 B Crystalline fine grained at 400 W 220 S. on
32843 south side of hill.

58 B Amygdaloid from 1000 N. 290 S. on S. side of
32844 hillock. Much gashed and cut by quartz
veins. (Mesabi amygdaloid).
59 B Fine grained massive gray at 1800 N.
32845 275 S. At its west end the crys. is brec-
ciated from some small quantity of the
fine conglomerate
60 B From 500 to 540 E of W cor Sec 18. 750 S. Trace
32846 narrow E+W running ledge of fine gr. conglom-
erate (greenstone)

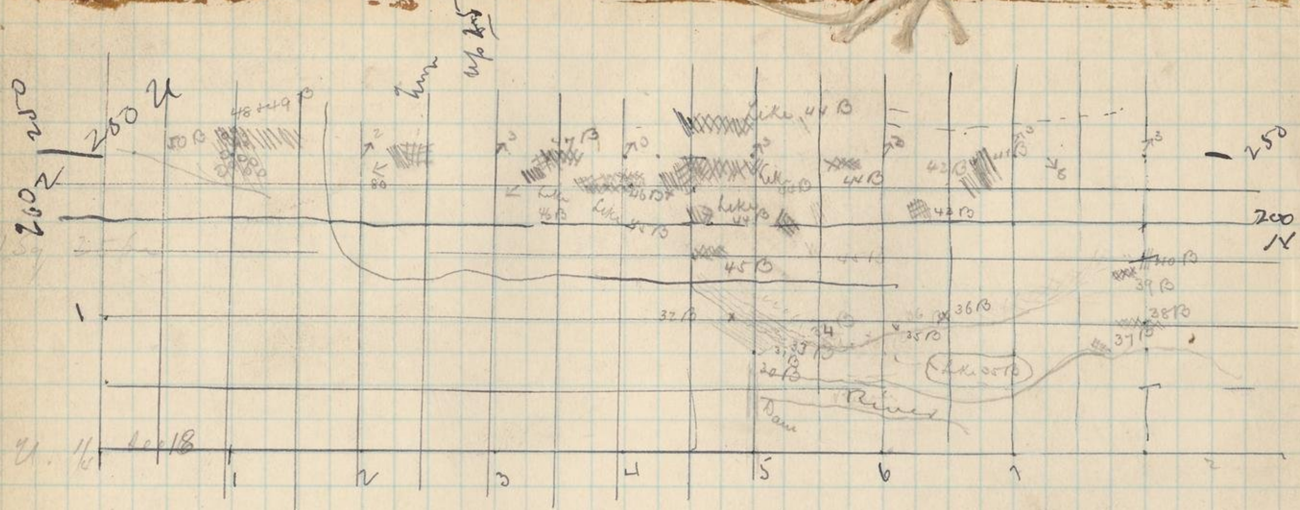
61 B 760 E. 760 S. of N.W. cor Sec 18 Amygda-
32847 loid
62 B 1550 W. 770 S. of "
32848 Fine grained gray, cherty like quartzite

63 B 1810 W 740 S of N.W. cor Sec 18 Fine grained
32849

Blank Pages

104-113

Skipped


200 N
250
Like 44 B
47 B
46 B
45 B
43 B
42 B
41 B
40 B
39 B
38 B
37 B
36 B
35 B
Lake 35 B
River
Dam
1
2
3
4
5
6
7


N
S

25 pairs

Sec 6

250 Ef 1½ p

500 E of ¼
70 N of line
Stake 45 N of W

500 E of 1/4
70 N of line
Strik 45 N of W

250
80
330

330

1078
1044
240
264
790

1261
413
330
80

454

710

250

30
1350
15
1365
1305
600

1261
502
520
18

tan 16° = .2867
sec 16° = 1.040

282
1.42

319

520.
474

2.0000 | 1.42
100
96
400

282
142
140
7
8.40

400
284
1160
1136
140

1.42 | 281

2000
141
590
566
260

141
281
1.42

338
142
480