



LIBRARIES

UNIVERSITY OF WISCONSIN-MADISON

Stearns County, Minnesota: [specimens] 5044-5097. No. 14 1883-07

Hall, C. W.

[s.l.]: [s.n.], 1883-07

<https://digital.library.wisc.edu/1711.dl/JEU4MXIMARDQN86>

<http://rightsstatements.org/vocab/InC/1.0/>

For information on re-use see:

<http://digital.library.wisc.edu/1711.dl/Copyright>

The libraries provide public access to a wide range of material, including online exhibits, digitized collections, archival finding aids, our catalog, online articles, and a growing range of materials in many media.

When possible, we provide rights information in catalog records, finding aids, and other metadata that accompanies collections or items. However, it is always the user's obligation to evaluate copyright and rights issues in light of their own use.

2622-2.
U. S. GEOLOGICAL SURVEY

FIELD NOTE BOOK

No. 14.

July 1883

Stearns Co., Minn.

5044 - 5097

C. W. Hall.

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

INSTRUCTIONS.

1. Devote at least two pages of this note book 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. 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 smaller spaces as 100 paces, each of the spaces between the red lines as 500 paces, and four of these large spaces as one mile, or 2,000 paces. Usually the southeast corner will be placed at the first red 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 down one space, 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, after which give in order 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 exposure as possible. Very often the notes for one section will cover more than one page in which case pass to the next right hand page, *repeating the map on each left hand page* as long as the notes, with regard to one section, continue.

3. Collect a specimen from each separate ledge of rock, or whenever 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 the note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples will be allowed, but in all other cases *large sized trimmed specimens*, with chips for slicing, must be selected in accordance with § 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. All specimens are to have numbers painted on them, in white on a black background, in camp.

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, etc., etc.

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

#1A

C. W. Hall Hearn & Co. Minn
July 1883

Sec. 28 T. 124 R. 28

Rocky St. Cloud



5044-A-B



5043

5042



5045-A-B



5044;

2000 ft; 1000 - 1400 ft.

This exposure on the N. side of the section is about 175 or 200 paces East of the Main Prairie road, & on the land of Mr. S. Hohmann. What lies N. of the Sec line belongs to Mrs. A. Strick.

Grimes like those on Exposures 5042 & 5043.

The exposure was not high, 10 or 12 ft being the height at the end nearest the road.

The surface weathers in concentric layers from $\frac{1}{4}$ inch to an inch in thickness. A 10 in. dip S 42° E irregular in direction the rock splitting in in one place. Another dip 40 inches

with NE & SW steps abt. Dike 5044
implly & after several feet a gain continues in a band 8 or 10 inches wide.

The rock is of the same dark color containing no quartz - but considerable mica & hornblende has been recently taken at other exposures. Both Mon & tri clinie feldspar seem to be present.

Near the ^{basal} other samples were taken showing the contact of the ordinary dark mass of the rock & a rather visible infiltration or modification.

The change of color is due to the Fe_2O_3 with feldspar crystals especially to the border of red iron oxide around them.

The suspicion is strong that these red individuals are orthoclase while the others forming with the hornblende the mass of the rock is trichine. A blue mineral looking like corundum was seen here in the darker colored portions.

A & B represent the modified & the dike rock of exposure

Sec.

28

T.

R.

⊙ 5043
5042

5044 + A + B

⊙ 5045
5045 A
⊙ 5045 B

5045;

1300 ft; 1000 ft.

This is quite an extensive exposure in plain sight from the Main Prairie + St. Cloud road standing 30 or 40 feet above the intervening prairie.

The surface is weathered like that of 5044. Some quarrying has been done. Joints similar in appearance + direction to those of 5044.

A prominent vein of a lighter colored rock material + somewhat finer in texture was observed and sampled.

Three dikes running NE + SW were seen. These were also sampled.

The dark or gray rock identical with that in the other exposures of this section and the vein material and the sample of igneous rock constitute the other numbers 5045 - 5045 A + 5045 B.

Two small exposures identical with 5045 are South East + the other South West of the main exposure were not sampled.

Sec.

28

T.

124

R.

28 W

X
 Road from Main
 Prairie to St. Cloud

5042
 5043

5044
 5044.0

5046
 5046
 5046/A+B

5046 - 5046 A + 5046 B,

3

5046 A+B

775 A; 1900-2000 W

On the East side of the road from St Cloud to Main Prairie + within 1175 paces of the E line of Sec 28 a high rock is present on. On the E side the exposure is 100 paces across by the roadside + extends 100 paces Eastward into the Section. The cliff slopes off rather abruptly towards the East + towards the road its continuity is interrupted.

The Surface is glaciated - considerably shatterd - + disappears under a wooded Swamp on the (3) side.

Joints appear; $\approx 20^\circ E$; $\approx 75^\circ W$ with a southerly dip of 80° ; minor joints in other directions.

The rock is identical with that on opposite side of the road; therefore see #5035

5046 A

Is a vein material taken from a vein of considerable extent upon the surface of this exposure. It is coarser than usually observed. It seems to be a fine-grained granite.

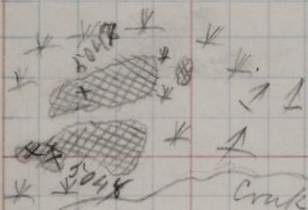
5046 B

Was taken from the dike 8 to 10 inches wide upon the top of the exposure + near the middle. It cannot be followed to the edge of the Swamp. Direction $\approx 70^\circ E$ Structure Columnar + at right angles to the perpendicular walls. Texture rather fine (dike narrow).

Sec. 33, T. 124 R. 28

5046 A+B

Woodland



5047 + 5048

1525 N; 1800 - 1900 W

See 33 has two large & high exposures on the land of Mr. Karter in the NW 1/4 Sec 33. Not much of the exposure is in sight of the road on account of the trees. But the southerly of two exposures starting just inside the fence on the W. line extends to a point nearly 400 paces from the road. Its width including some low rock standing just above the slough in the SW 1/4 & W 1/4 of the Sec. is over 100 paces.

The rocks are covered to considerable extent with oaks & underbrush. The ledge when exposed is rounded & glaciated & weathers into thin layers resembling the concentric weathering of several other localities in the township.

Inclination of surface in all directions; only abrupt face 8 ft high on NW side of the southerly outcrop. Both increase highest toward the eastern extremity. This northerly outcrop is somewhat higher than the southerly one and to the east of it and separated by a swampy tract of some paces width lies a small exposure which was not sampled.

The only "Strike" observable is the northeasterly & southwesterly trend of the ridge of the two exposures agreeing in that respect with the similar direction on the west side of the road — see box 5049 to 5055 etc.

No dikes were seen on the exposures but veins

Sec. 33

T. 124

R. 28



5046 A+B

5147



51



5048

Creek

Woodland

5047 + 5048

1525-1700 N; 1800-1900 W

of a lighter colored material running in all directions; they are of all widths from a foot down to mere threads soon disappearing. These healings point to a previously shattered condition resembling that now shown by the multitudinous joints of some exposures, no doubt being different series of joints.

Joints N 20° E; S 43° E; N 60° E; etc and all nearly or quite perpendicular.

It was from this 1/4 of 1/4 Sec that rock has been quarried for the St Wendel Catholic Church.

Over the surface of these exposures especially on the highest part of 5047 are many pit-holes - like excavations, 6 inches across & 10 deep. They were not smooth in the inside but have probably been roughened thus weathering.

5047

A mixture of hornblende & feldspar - the latter white and greenish - texture medium - very fine from accessories - veins common of a light color & finer texture than the mass and containing mostly in fine granules.

5048

a darker rock than 5047 owing to excess of hornblende & a reddish or brownish tint to the feldspar. Texture same finer than the preceding contains less veins & is equally free from accessories. Also fine & sub-triangular.

Sec.

32

T.

129

R.

28 W

5054

5055

5053

5052

5057

5049

5049A

5050

5049, etc.

There is a continuous exposure of rock from the point when the road crosses the ledge 188 ft. N of the S line of Secs 28+29 towards the Southwest almost through the NE $\frac{1}{4}$ Sec 32. This mass of rock was passed over from the road to the SW extreme and samples were taken on the way back.

The surface shows over the whole extent of the extended exposure is glaciated; the slopes on the NW + SE sides are quite abrupt for a part of the way.

There are many joints, the leading one SSW + SE, dipping 65° South at some places - at others perpendicular.

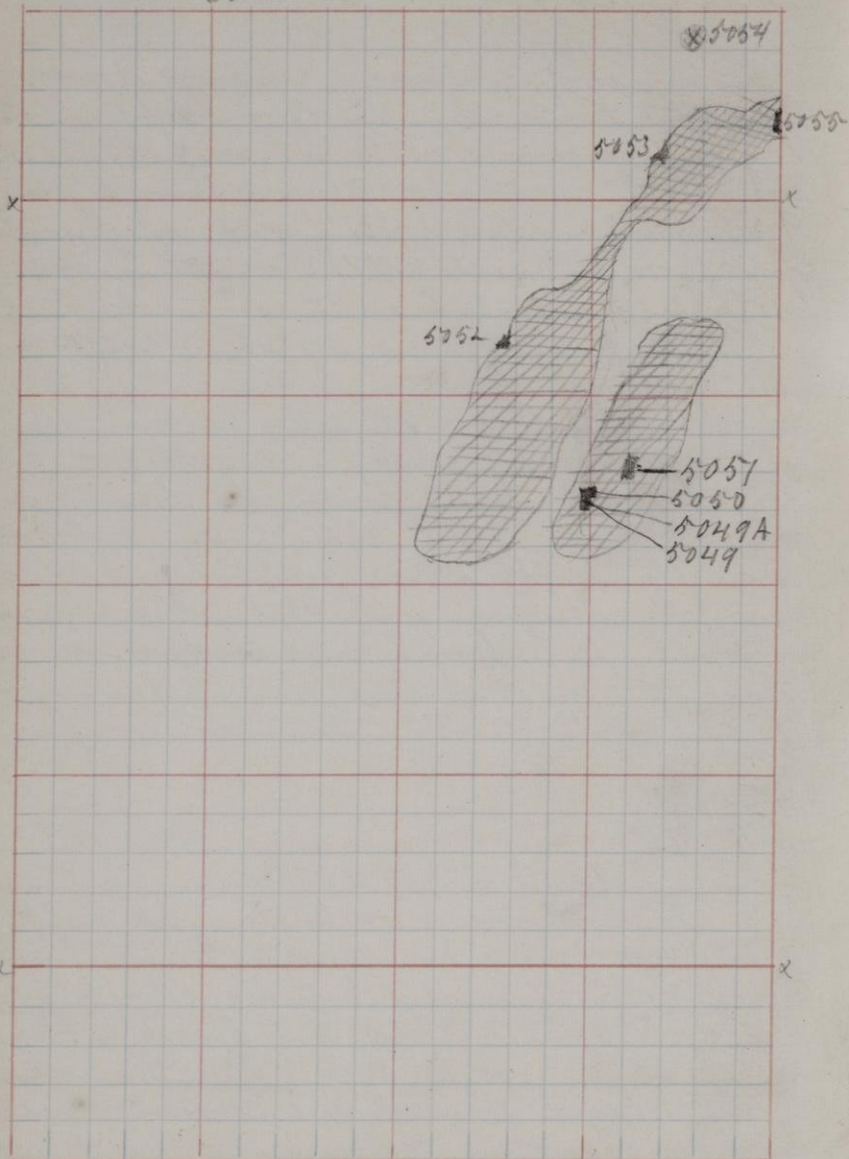
The softer parts of the rock, the seams + joints have been worn away so much more than the rest that the surface has become quite uneven. Some hollows being many feet across.

5049

1250 N; 500 W

This exposure is on the line bet. the SW $\frac{1}{4}$ + the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Sec. 32. Ground is low - only a few feet above the meadow. Both dark colored + pink or flesh colored granite is here. Dark lies above + has running thru it in all directions + of every thickness from $\frac{1}{4}$ inch upwards to several inches + very irregular in width + direction. This rock 5049 contains feldspar (apparently mono + tri-chine quartz in small quantities) hornblende + mica, much like other localities near

Sec. 32 T. 124 R. 28



5049A

1250 ft; 500 ft

This shows a fine somewhat dark rock with hornblende + feldspar as the chief ingredients + fine grains of quartz. The surface is coated with a dark green chlorite? mineral along the seams. Observe the long fine sparkling needles, possibly actinolite.

5051

1300 ft; 400 ft

Passing 100 paces NE from the preceding quarry of the Karlov was reached. This is a fine flesh-colored hornblende granite. This quarry is 25 ft or more above 5049; the rock "peels off" towards the N + NE in layers 15 in. or so thick, — one being between 2 + 3 ft in thickness.

5050

Just a few feet away + in a layer which passes under the one just mentioned viz 5049 with 5049A, and dipping to the N-NW some 4° or 5° is the location of the sample bearing this number.

This is apparently the same as occurs in the quarry 5051 — only a trifle more weathered — it has the same flesh-colored feldspar + nearly the same proportion of hornblende.

Sec. 32 T. 124 R. 2V

Sec 29

50521

50531

50521

5051

50491

6050

A

5052

1650 N; 750 W

At this point some little quarrying has been done. The rock reaches a height of 30 ft above the marsh around it upon the N + W. But little variation is seen here from what may be observed over the whole extent of the exposure. The joint running N + S is quite prominent. Inclination both to the NW + SE is from 5° to 15° . Often along this NW side the walls are nearly vertical to a height of 8 or 10 ft above the marsh.

Feldspar hornblende + mica are seen. Mica appears comparatively abundant, forming plates in feldspar also inclusions of mica scales. Quartz not distinguished with certainty.

5053

See 29 - 150 N; 300 W

This is an exposure on the same mass of rock + shows all the general characteristics of the rest. A striking appearance of the rock due to the occurrence of thin or few bands or veins which may be seen on some of the samples taken is, more evident here than elsewhere noticed. The cause of this difference between the two kinds (the light + the dark) is apparently due to the small percent of hornblende as compared with the feldspar + the presence of quartz + pyrite in the veins, - the fact on the samples having the narrower measure,

Sec.

T.

R.

29 T. 124

R.

5064

✓ 5065

5086

5262

5461A

5461

5460
6464

2

4256

54262

0007
5422A

2001

5065

unsanctified

Poirier

Wood

X 5052

5259

2929

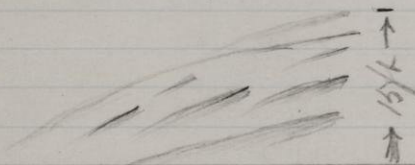
5054;

400 N; 250 W

This is an exposure standing out in a field at a distance from other exposures. The height is 15 feet the area near 40 x 75 feet. The rock is of the dark variety & is almost identical with #5053.

The exposure seems to show on the west end the nearest approach to a bedding to be seen at any spot thus far visited unless it be the Cold Spring contact belt stretching across the Bank River just above the Mill dam.

2 of the following sections:



Front view
inclination N. 9°
" E. ?



End view

In 2 leaves further on

Sec. 29 T. 124 R. 28

5052

5052

5052

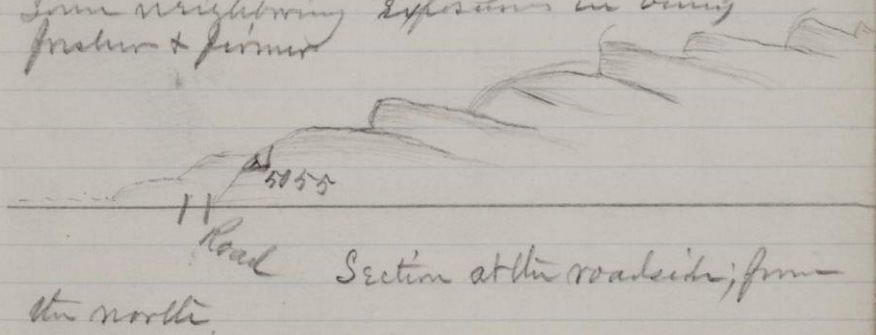
5055;

175-300 ft; - W.

This exposure inclines from the top of the rock to the road Northwesterly at an angle of 50° . This is the maximum slope; owing to the uneven removal thro' glaziation the inclination is in places less. The rock has been quarried to some extent but the parties opening the quarry abandoned it because, as the neighbors say, the rock was too tough to work profitably & so uncertain in its fracture that no good blocks could be split out of it except by accident.

The highest part is 20 feet or more above the road - the joints over the surface are similar in direction to those already noted from other parts of the long exposure extending nearly thro' the section south of this.

The rock is a fine fresh gray hornblende rock differing in that from some neighboring exposures in being fresher & finer.



Sec. 29 T. 124 R. 28

© 50524

5453

50524 + 13

5054

400 N. 250 W.

Continued

11

The joints at this exposure are similar in direction to those by the roadside 5054A + B. also 5055 + 5055-5.

The rock shows different shades of color in different parts of the exposure.

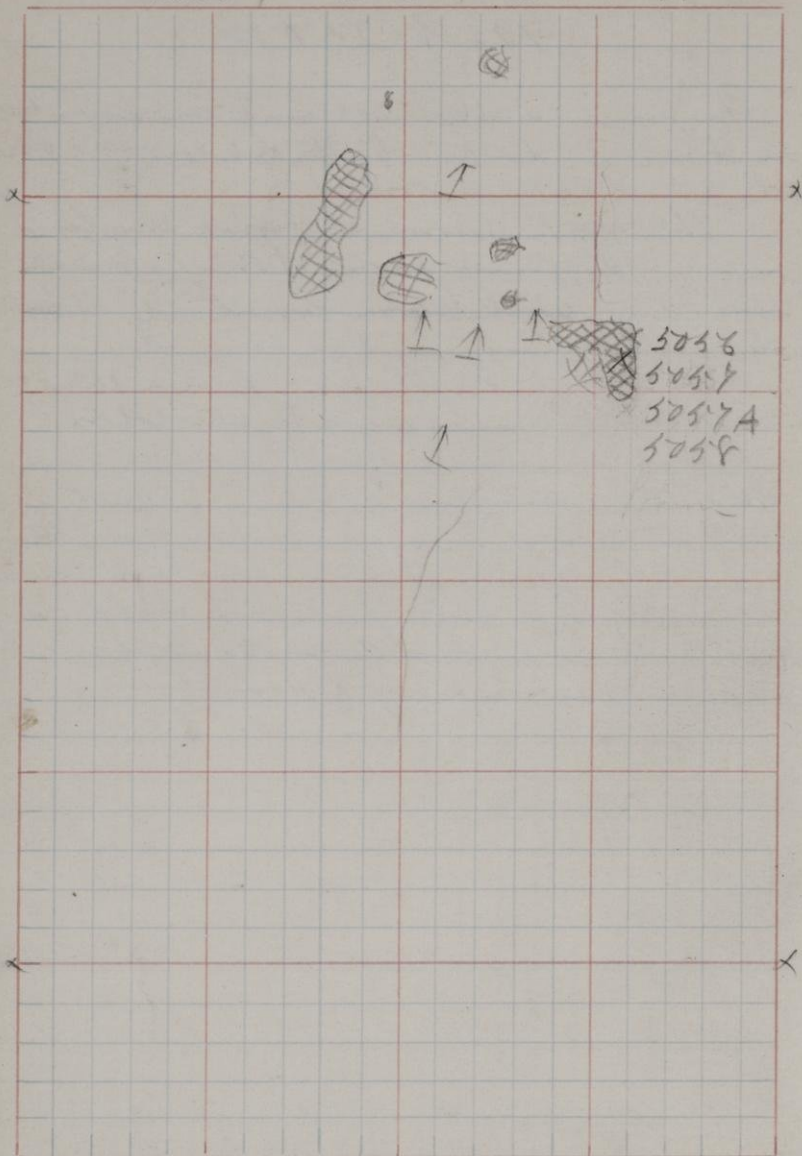
It is as a whole a fine weathered but where the quarrying has been done a fresher look appears. Here & there are veins & masses of a lighter colored material in which quartz can be seen.

Altho this mineral is not seen in the main part of the rock in any marked quantity.

In other places darker spots are seen consisting of a larger proportion of basic minerals - some of them of walnut size seeming to be entirely of hornblende.

(9-891.)

Sec. 29 T. 124 R. 28 W



5056;

1450 ft; 400 m.

This exposure 200 paces E + W + nearly as far N + S, rises at the edge of the wood just S of Mr Hartmann's buildings only 8 or 10 feet above the surrounding ground. The surface is wavy + glaciated + for the most part covered with a growth of small oaks + underbrush.

Glacial marks on the side of a dike on the top of the exposure give direction N. 37 E.

The same faulting off to the N + E is visible here that has been observed on nearly all the exposures when a fair north easterly slope occurred. And at this place the faulting off was nearly parallel with the glacial striations mentioned above.

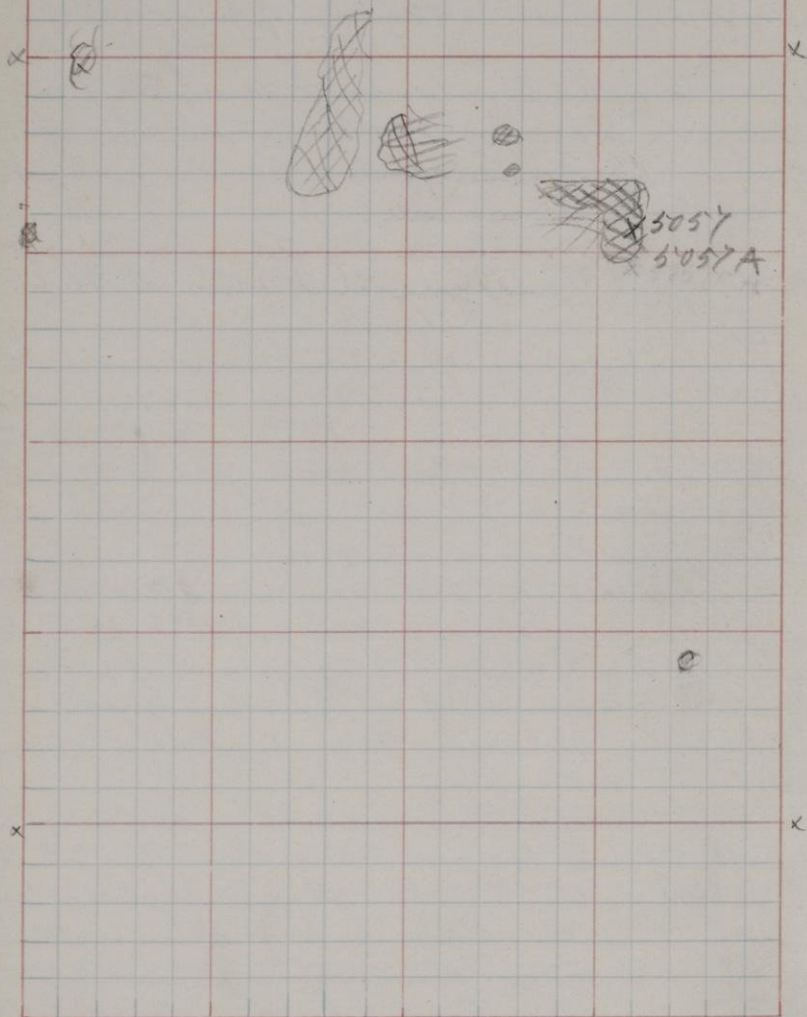
A dike N 60° E was seen. Described.

Joints were observed N + S; N 70° E vertical.

The main rock (5056) consists of a coarsely crystalline aggregate of red feldspar quartz + hornblende. No mica observed. The feldspar evidently orthoclase.

The surface weathers to crumbling when sufficiently exposed but not to that degree observed at Rockville + other localities where the crystals are coarser. Quartz stands out as granules on fractures + weathered surfaces + thus slows disintegration it seems to protect the other minerals. Quartz + hornblende seem to fill the interstices between the feldspar individuals.

Sec. 29 T. 124 R. 28



5057

1450 N; 400 W

At the South East corner of this exposure the rock has been quarried to some extent.

The quarry stands in a vein or band of quite a different color & texture from the main mass of the rock represented by no. 5056. This vein appears 15 feet or more wide. Direction could not well be determined. The rock is shattered by a system of joints, perpendicular, running N.S. and from 1 inch to 6 inches apart.

A reddish tint is observed in some places as samples show and the whole rock is characterized by a firmness of texture, a grayness of color, a "firmness of look" a smoothness of fracture & a cling under the hammer stroke quite unusual in the samples taken thus far.

Feldspar is noticed as triclinic according to twinning lines. Occasional X-twins are quite large & as they break along cleavage planes they give a porphyritic appearance to the rock. Hornblende is finer & with a glass can be seen included in the feldspars of larger size.

5057 A Is the surface rock similar in features to 5057. Feldspar & quartz seem to be principal ingredients. Hornblende & mica appear in less quantity at the surface than deeper

Sec. 29 T. 124 R. 28

5004
5056 etc

5058;

1450 N; 400 W.

A dike from 13 feet wide downwards across a part of the main rock shows some curious breaks of direction but $N 60^{\circ} E$ appears to prevail.

It breaks up into many sub-divisions + branches, stopping abruptly to continue on, after a few feet, in a much narrower belt than before.

The rock is porphyritic, with both quartz + feldspar in a mediumly coarse matrix. Both matrix + porphyritic crystals are finer in the narrower dikes + branches from the main one.

Masses of the main rock were noticed taken up by the dike + apparently completely inclosed by it; both were very much shattered.

In a general surface of the exposure only 20 or 30 feet across, the dike disappears not to be noticed again towards the NE.

Sec. 29

T. 124

R. 28



② 506010

② 5059

Not Sampled

5059;

1700 N; 700 W

This is the old quarry as the owner called it. Rock had been removed to the amount of many hundred cords. The rock resembles in both structure & texture the reddish rock of the quarry just described. The inclination of the beds is the same. The thickness of the layers agrees but that crushing & re-crystallization in the seams of the westerly dip are not here to be observed yet the north-easterly dipping surfaces show the "Slickensides" + "Chopping in" of the same inclinations in the other quarry.

No dark colored rock appears at this place; no dikes occur here.

The rock is a reddish hornblende granite with a fair proportion of quartz & feldspar ^{the latter} exhibiting two different colors. The red by far predominating.

Mr Hartmann the owner of the quarry assured us that he had gone thus the granite in this quarry (about 6 feet below the present level of the water) to a quicksand of lighter color — for the last foot or two of that distance the granite was so shattered as to be worthless for "Cord Stone".

Sec. 29 T. 129 R. 28



5860

5859



Not Sampled

5060;

5060A also

1800 ft; 700 ft.

This is an exposure of hornblende granite 100 paces $\pm$ E + S W + half as wide. In an oak grove, joints $\pm$ 70° E vertical. Bedding planes likely fall in the same direction with a dip of 23° . Other joints $\pm$ W + S E also vertical.

The bedding mentioned is similar in both quarries but certain peculiarities are noticeable here which were not observed in the S or "old" quarry where 5059 was taken.

As the surfaces are exposed in quarrying a distinct slickensides is seen - especially on those surfaces having an inclination of 13° as the dip becomes in the eastern part of the quarry. Along these slickensided surface striations can be seen at right towards the top and these striae or grooves cut into the harder surface in an upward direction as a heavy nail pulls into the finger or, better, as a jack plane tears up a board when pushed against the grain, suggesting that the direction of movement of the overlying layer was upwards.

That appearance was on the $\pm$ E slope or dip; towards the S W the dip of a system of cross planes is 10° . Instead of a slickensides there is a shattered mass with in some places a coarsely crystalline texture. Feldspar is present & the cleavage planes of this mineral generally stand at an angle to the surfaces as is frequently seen in pegmatitic veins. Layers an inch in thickness

Sec. 29 T. 124 R. 28

5066



5061
5061A



5060

5060A

5060



Not Sampled

and in some instances considerably more.

There appears everywhere to be a seavage not a thick earthy layer but a distinct separation between the granitic arrangement of the mineral constituents of the rock mass & the vertical arrangement of the vein or layer of crushed matter.

5060A In some places the contact between the red & the gray can be seen; the red is coarser & brighter & coarser in texture than the gray. The latter is apparently a mass or lump in the former rather than interbedded in it.

5061

Is the gray rock of the quarry.
This as indicated above does not constitute the larger portion of the quarry rock.

This contains trichlinic feldspar & some of the cleavage planes exhibiting beautiful twinning striae. Hornblende is also present but the granules are small as compared with those of the red granite 5060.

This characteristic of size runs through all the constituents of the rock.

Sec. 29 T. 124 R. 28

5086



5086
5086A

5061 A;

1800 N. 700 W.

This represents a thin layer between the beds of the red granite of this main quarry of Mr. Hartmann.

It occurs on the false E bedding of the westerly slope. These layers are about 1 inch in thickness with a soft brown cushion between them and the overlying & underlying beds. These layers represented by 5061 A are colored crystalline masses of quartz and feldspar.

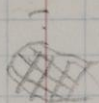
The quartz seems to be in greater quantity in the middle of the layer but is distributed throughout the whole thickness.

While the feldspar shows by its cleavage planes that the crystals were arranged at right angles to the surfaces in the same manner as in many veins; and this fact seems to suggest that these layers are horizontal veins or rather veins inclined at an angle of 10° from horizontal. Still the material does not look like any other vein material seen in this vicinity and it is considerably flattened as already stated.

5061 A

Dip 10° S. WestDip 13° North East

Sec. 29 T. 124 R. 28



Ø 5062



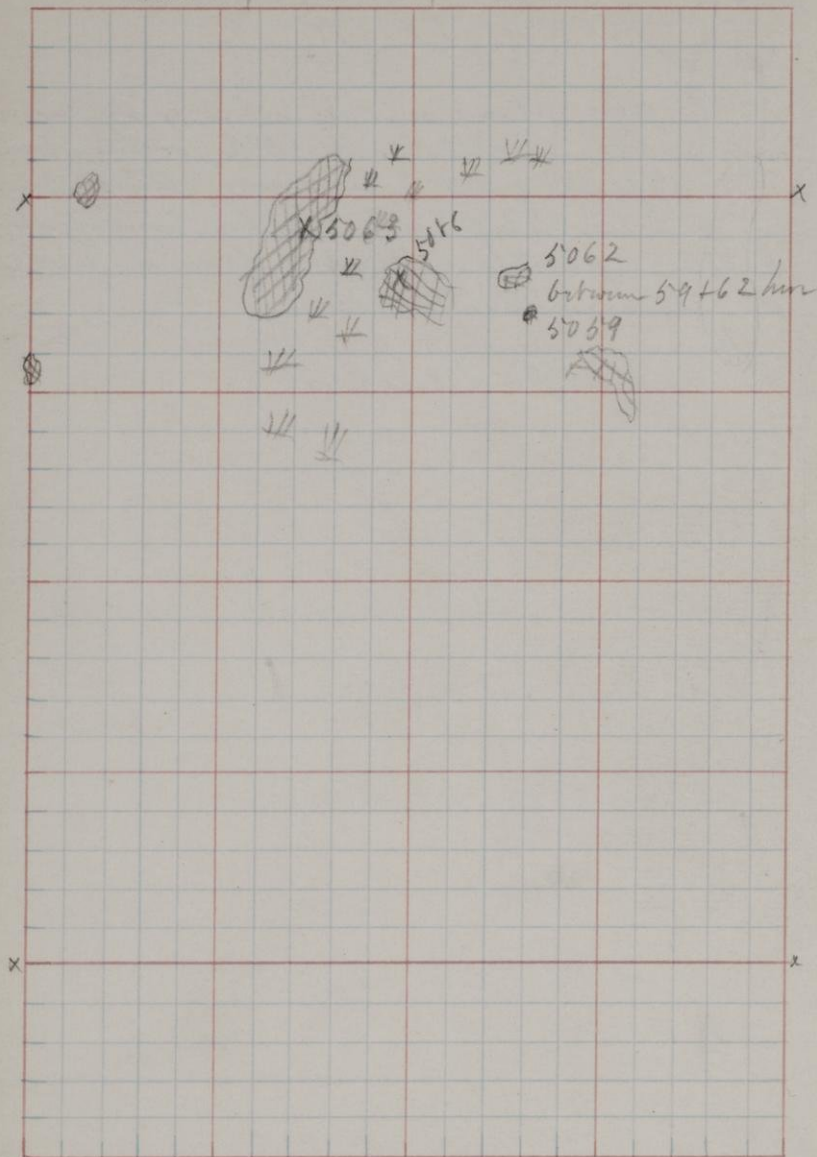
5062

1800 ft; 700 W.

A dike about a foot wide with several interruptions extends $\pm 30^\circ E$ or thereabouts. It appears quite like many others seen in the township. The rock is singularly brittle splintering finely & flying from the strokes of the hammer.

This is somewhat porphyritic with both quartz(?) & feldspar.

Sec. 29 T. 124 R. 28



5063;

This ledge is quite extensive and conspicuous. Crossing the N line of the N.W. $\frac{1}{4}$ Sec. 29 it forms a considerable exposure in both sections 20 + 29. Its whole length is not less than 450 paces its direction N E + S W. Along the Southeast side is a considerable extent of very wet meadow, most of it too wet for cutting hay.

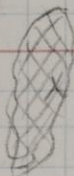
The rock is rhyolite & upon the surface considerably weathered hornblende granite. The prevailing color is red tho' on several spots the rock seems to show evidences of passage into the gray with trichloric feldspar.

No dikes were observed.

The joints take the usual directions of those in these many exposures.

Sec. 24 T. 124 R. 24

5064



5063

5065

5064;

This exposure rises 10 feet above the field on the S side and stretches some distance to the north in the woods and disappears beneath the surface in the side of a low drift ridge (20 paces wide by 30 to 40 high).

The surface of the rock is glaciated and weathered so that it crumbles considerably.

The exposure facing Southwards does not show that "peeling off" which is noticed on many surfaces in the vicinity.

No dikes were noticed.

The seams & joints run in various directions; they were many in number.

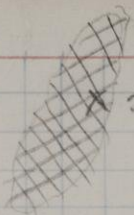
The rock is gray - no good fresh samples could be knocked off.

What was taken was of a dirty brown color & chiefly feldspar & hornblende with occasional bright shining scales looking like Magnesian mica.

Sec. 29 T. 124 R. 24

East

North



5764

X 5763

5765
5765A

5065;

This Exposure is 150 paces West + 425 paces South of 5064. It is a narrow belt of rock along the fence held to be the Section line between Secs. 29 + 30.

The rock does not stand more than 3 feet above the field.

The inclination of the several layers to the N.E. is at an angle of 35° . In this ledge is another example of that "peeling off" of the rock towards the N.E. or a relic of some one-time bedding.

The rock is red like that at # 5063. Feldspar, quartz, hornblende + mica were the constituents observed; no accessories were noticed.

5065A

Lying on the W. Side of our way

Is a mass of dark rock with in the red - the red hornblende granite of this part of the township. The dark seems to have considerable mica in it - more than most of the localities showing the dark rock. The boundaries of this dark colored part can be seen by close observation the lichens covering the two areas alike.

The red rock could be seen upon both sides of the dark but the fact that the dark disappears towards the South indicates that it is not a vein.

Sec. 19 T. 124 R. 28

5066
5065
5065A5065
5065A

5066

-A; 100 W

This exposure is only 350 to 375 paces north and 75 west of the exposure 5065. This is an outcrop of several hundred paces in extent reaching to the spot where nos. 5040, 5040A + 5041.

The rock forms a high bold cliff, cut in one or two places by dikes having joints like those on the northerly part of the exposure already described (5040).

This rock is quite silicious showing much free quartz, + some mica granules of considerable size.

The feldspar is red giving the general appearance shown by 5064, 5063, etc.

5067

Represents the rock at another part of the exposure 300 paces long by 200 ft wide. It rises 30 feet on the north east side in a nearly perpendicular wall, the slope of the rock is northerly & when the rock rounds over to the eastward the layers of glaciation are clearly seen.

The rock varies a little in color at different points, showing the redder mica-free modification of the porphyry and the grayer mica-bearing, seen in the samples described.

Sec. 20 T. 124 R. 28

5068
5068A
5069

5068

75 ft; 1900 W.

This is an exposure lying to the eastward of 5067. It is 75 paces east & about the same distance north of the S W corner of the section.

The joints are $\pm 70^\circ E$ and $\pm 25^\circ E$ both systems nearly perpendicular.

Quarrying has been done on the S E side of the exposure which consists of a cliff 150 to 175 paces long and 75 ft wide.

This rock is a red hornblende granite with some greenish dirty looking granules probably of feldspar. Quartz is not so abundant as in some other localities near. It is a very fine grained rock.

5068 A

Several dikes a foot or more across and several smaller ones were seen taking the same general direction as the rock exposure.

These samples show the contact of these rocks, the red granite & the igneous as that contact appears near. Some of the narrower dikes branches off the larger ones.

Sec. 20 T. 124 R. 28

5068
5068A
5069

5069;

15 N, 1900 W.

Within the preceding to 5068 is a mass of this no, 5069. Several feet in extent.

It has been blasted into so its outline can be distinctly seen for a part of its extent that upon the upper part of the face of the quarry. Several seams define it on the lower side.

The included mass is several feet in diameter the change from one rock variety (or species) is sharp & clear.

This number seems to be a trichine feldspar with mica & hornblende (?) & the gray ankers. Is this not very similar to the exposure beyond Cold Spring which was called provisionally Mica Diorite ? is that which was numbered 5016.

Sec. 28 T. 124 R. 28

Primm

5072

5070

5070;

Griffin Quarry, E.

1500 N; 50 W

This Exposure extends along the South line of the NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 28 + within 30 paces of the West line of Sec 27. The exposure is 50 paces or more wide and 250 paces long extending nearly East and West. A marsh bounds the outcrop on the N, E + S sides; a tract of woodland on the west. For the most part the rock rises only far enough above the surface to be seen but in one or two places it reaches 3 feet. Surface is smooth + rounded + weathered off in scales like #5044. Jointing not pronounced. Dip of Surface 40° NE.

Hornblende + Triclinic feldspar recognized; also Crystals + granules of iron pyrites.

5071

1500 N; 100 W

The Same Exposure as described above. A dike $2\frac{1}{2}$ ft wide runs thro the South side in a direction $N 45^{\circ} E$.

The dike seems to be nearly perpendicular + quite free from joints so that large pieces can be taken the full width of the dike and four or five feet long.

The rock seems very hard + fine grained - grains not so fine as in some narrower dikes. Not porphyritic nor containing accessory minerals.

Sec. 28 T. 124 R. 28

* 5072 * 5070
* 5073 * 5071 *

5072;

1500 N; 425 W.

This Exposure is 75 paces long & 25 ft wide. It lies just N of $1/4$ Sec line & rises 8 feet above the surface around & is owned by the same man Mr Devin. The same bench extends to the north & south of this exposure as nearly inclines 5070-71, - the two form parts of a nearly E & W ridge running thro' a block of low land & both exposures have been more or less quarried. Both on a like in lithological character. A dike occurs here also.

This sample seems rather more weathered than the other 5070 but otherwise identical. Inclination of Surface N 40° .

5073.

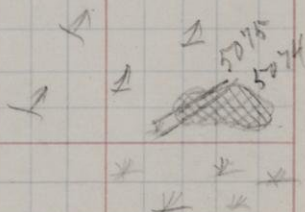
1500 N; 425 W.

A dike thro 5072; Width, $8\frac{1}{2}$ feet; direction N 60° E; occurs on S side of this exposure.

The rock is massive & breaks in large blocks. Texture somewhat coarser than #5071, in other respects identical.

Sec. 21 T. 124 R. 26

Bowie



5074;

550 N; 60 W

Exposure 260 paces long + 75' Is with
Course to 70° W. Height 8 feet above the
marsh on S. + E. Sides. Wooded N; on
the N. Channel

Rock appears massive ^{in the quarry} — as much so
as any thing for some.

In the north part of the exposure two (2)
dikes nearly parallel coursing to 45° E —
the northerly one 6 feet wide + the other
only 8 inches

The rock of this exposure is considerably
weathered; it loosens in concentric layers.

Joints showed no definite direction.

The rock is the characteristic dark fine
Syenitic species of this region with Fe₂O₃ occurring
in small quantity + fine grains.

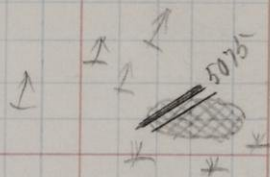
5074 A

Along the north side of this exposure
the rock is of a slightly brownish tint
+ in general a more decomposed ap-
pearance. The rock is easier to work
+ for this reason most of the quarrying
has been done upon this side.

Further than in the matter of decom-
position + attendant brownish this num-
ber seems to be identical with the
preceding, 5074.

Sec. 21 T. 124 R. 28

Brain



5075

550 ft; 60 ft.

The two dikes, one 6 feet wide and the other 8 inches cutting through the exposure sampled by #5074 + 5074A in the direction $N 45^{\circ} E$ have already been mentioned.

The material from the wider of these dikes is of coarser texture than the other.

Both appear quite massive and much less jointed than most of the dikes we have thus far seen.

Accessories or cavities for gathering the various infiltration products seem to be singularly rare in the dikes of this section.

Sec. 30

T. 124

R. 28



5076

5076;
1400 ft; 200 ft;

This exposure shows nearly equal unconformity in both length + breadth but enough greater distance along the ridge which runs nearly N.E. + S.W. - in this direction 250 paces or more were counted while barely 200 made up the length. The surface is largely covered with a growth of oaks. The ridge is quite high rising some 30 ft high on N.W. side which appears to better front of the exposure & when considerable quarrying has been done. Surface is rounded + glaciated, and dis-appears under the soil at a slight angle - not over 5° in any spot observed. No large boulders were seen lying near.

Over the surface, running in all directions are numerous small veins from those 6 in. or more in width down to the merest thread. They are evidently of equal age for they do not seem to cut each other as they formed at different times + under different conditions are apt to do, nor do they show to the naked eye any difference in constituents. So far as noticed there was no uniformity of direction.

That part of the outcrop consisting of the "red rock" can be traced in distinct outline from the gray or dark of which there is a large proportion at this place.

Joints were noticed coursing in all directions, among those noticed were N 50° E N.E. + S.W. &c while the bedding on which the

Sec. 30 T. 124 R. 28

5776

5076; quarrying has been done like N. W. W.
The surface is so covered that it could
not well be seen whether there was the same
bedding towards the NE as has been observed in
other exposures or not.

The rock is a coarse red hornblende
granite with some green feldspar individ-
uals and a poverty in quartz grains is
noticeable - at least in a part of the area.

Sec. 30 T. 124 R. 28

5776
5777

5077;

1400 N; 200 W.

This is the dark-colored rock located on the same exposure. The feldspar seems to be in part at least tridetic for the twinning strains can be distinguished on some cleaved surfaces with a pocket lens, & occasionally even with the naked eye.

Quartz is seen but not in such large granules nor apparently so abundant as in #5076. Hornblende is present and quite fresh. Biotite also present and prominent in bright black shining scales intermingled with the hornblende.

No accessory minerals were observed.

In weathering this rock does not change as does the variety 5076, but along the weathered joints a soiled appearance is imparted to the adjoining material.

Sec. 30 T. 124 R. 25



5076
5077
5078

5078;

1400 ft; 200 m

This number covers a series of Samples - two series perhaps - from a part of the ledge where quarrying had been done.

Some pieces appear porphyritic in the irregularity of arrangement seen in the different mineral constituents; the dull color & the apparent lack of homogeneity in some of the individuals strengthen the delusion.

Other hand specimens are partly the red 5076 & partly the gray 5077, but neither part looks like the specimens 5076 & 5077 & the whole section of the quarry whence these were taken looks like a contact zone between the two types.

Some of the feldspars show a tinge of green & others a tinge of red.

Sperry seems to be less abundant here than in either type - mica shows bluish an about equally (each & each) distributed.

This modification gives a strong clayey or aluminous smell on being freshly broken or breathed upon.

Sec. 30 T. 124 R. 28

5076

5077

5078

5079

5079;

1400 ft; 300 M.

This is a sample of a dike running
across the N.W. side.

It is 7 feet wide and runs N. 40° E.

The rock has a medium texture -
not many porphyritic crystals even seen.
It gives quite a sharp clear sound
when struck with the hammer + breaks
with a very smooth clear fracture.

No accessory minerals observed in this.

Dike characterized by feldspar from
joints.

Sec.

19

T.

124

R.

28

5061
~~5061~~
5080
5080A

5080;

750 ft; 800 W

This exposure stands out of dry ground on the S E side and wet on the N W side, some 8 or 10 ft at the highest point. But the larger part of the exposure is low + covered with weeds + scrubby oaks.

Gen. direction N E + S W 1300 paces long + 150 wide.

Rock is worn by glacial movements + is weathered to a mass of broken feldspar crystals whenever it is protected from erosion. The highest points are considerably broken into huge angular fragments + boulders.

Joints N 85° W; N 15° W, ^{both} nearly perpendicular; others which seem to be subordinated are somewhat inclined.

Rock is very much weathered + shattered.

5080 A.

Is a fine rock occurring over a part of the exposure. Owing to the covered condition of the surface the relation of it to the preceding could not well be determined.

The feldspar seems to be of varying size. Some of the crystals quite large. mica is not prominent as a constituent, no accessories were observed in this

Sec. 19 T. 124 R. 28

1944
X 3050
5050A

nor for that matter in the other.

The rock weathers to a brown instead of reddening the feldspar crystals alone. I compare this exposure with that on Dec. 30

5081

A dike 12 feet wide extends across this exposure coursing $\pm 40^\circ E$.

The surface is like 5070, quite free from fracture but shows distinct inclination to distinct basaltic structure.

Surface has been worn smooth by glaciation but no striae remain.

Rock is of medium coarseness & an occasional large feldspar crystal was noticed - one $\frac{3}{4}$ inch long, was broken through.

The main rock in its weathered condition has the characters of our old acquaintance of St. Augusta & Rockville on a smaller scale. Especially does it remind me of the Quindaro granite save perhaps in the size of the feldspar granules. Similarities is # 5002

Sec. 20

T. 124

R. 28W

x

x

x

x

x

5284
5285

5282

5283

5082; 250 ft; 1020 W

This is a coarse red rock very much decomposed at the surface which is the only part in sight or to be secured.

It is a low mass only a few paces in length or breadth + not high enough for quarrying.

The location is about 10 paces from the old road from Roanokeburg $\frac{1}{4}$ out to St Cloud. It is about 200 paces from the S line of the section.

It is evidently an extension of the extensive exposure running N + S over the Roanokeburg $\frac{1}{4}$ section.

Sec. 20 T. 124 R. 28

5782

5783

5083;

508; 1050 W.

A dike near the line between Sues
20 + 29 Crossing $\pm 55^\circ W$ + 2 3 feet
wide

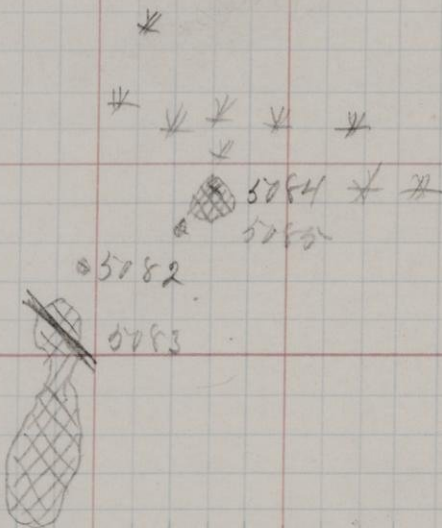
The rock is much broken + thus has
been weathered much faster than the
feldspathic ^{granitic} rock on either side

Columnar structure is visible in the
middle part of the dike with perpendicular
Columns 4, 5 + 6 sided

Texture is medium - probably coarser
what coarser than most of the Odiasua
thus far seen.

The Surface is 3 feet below the
granite on either + it appears glaciated
Weathering has browned the surface
to some extent

Sec. 20 T. 124 R. 28N



5084; 400 N; 700 W

This exposure stands some 15 ft above the marsh which stands on the north & east of the rock. An oak grove covers a part of the exposure & extends to the South and East.

Upwards of 75 or 100 ft long & 50 wide
 Glacial Striae run; $S 34^{\circ} W$ & $S 30^{\circ} W$
 Joints run to run in all directions
 Chief an $N 60^{\circ} E$; $N + S$.

Rock peels off & shows a bedding towards the Northeast.

The rock is a reddish hornblende granite with numerous veins of the lighter colored finer grained material running in all directions thro it. It seems peculiar in the appearance of the feldspar! Some crystals have Karlinizk & others show a brighter red along cleavage & fracturing planes with a pink tint to the whole & still others are fresh & white. This peculiarity seems to be confined to streaks in the rock.

5085 Is like material running thro the rock with varying direction, but measuring in one place $N 35^{\circ} E$.

Two or three dikes 2 or 3 ft wide much shattered, hard & glassy to break of fine texture as compared with #5083,

Sec. 29

T. 124

R. 28 W.

5082
5085

5082

5083

x 5085

5086

Not Sampled

5086;

1800 N; 1000 W

This exposure several hundred paces in extent makes 100 paces to the west of the $\frac{1}{4}$ Sec line and east - mostly covered by other exposures forming the quarries of Mr Hartmann, nos 5059 + 5060, width near 150 paces.

The rock is 40 or 50 feet high.

Joints N E + S W; N + S; etc.

One dike was observed 2 ft wide with an irregular N E + S W course.

No sample was taken of the dikes.

The rock is the ordinary hornblende granite so common on sections 20 + 29.

Quartz, feldspar, hornblende + mica are present - the feldspar being red orthoclase.

The dark rock of Sec 20 also is found here but in too weathered condition.

The exposures on this $\frac{1}{4}$ Sec - 160 acres owned by Mr Rosenberg cover at least 20 acres. As the hour was late time would not admit of going over the whole and sampling the various parts.

Sec. 18 T. 124 R. 28

3787

✓ ✓ ✓ ✓
✓
✓

5087;

5088 + 5089 See *Siderites* section /
750 ft; 60 W

This mass rises as a rounded knob
elliptical in outline some 25 feet above
a marsh on the South side

Direction of the exposure N 70° W
folds N 65° W with a dip 85° NE

" N + S vertical

" N 20° E incline 80° to the west,

A bedding (faler?) was observed sloping
5° or less to the SW along which the rock
was mined in quarrying.

No dikes were observed.

The rock is a fine textured firm and
bright looking mixture of feldspar and
basic minerals one of which, tho' in small
proportion, is mica.

This could not be detected with cer-
tainty in the fresh rock but it is seen
in the weathered parts of the quarry,

Sec.

18

T.

124

R.

28

Woodland mostly.

5287+

5288

5289



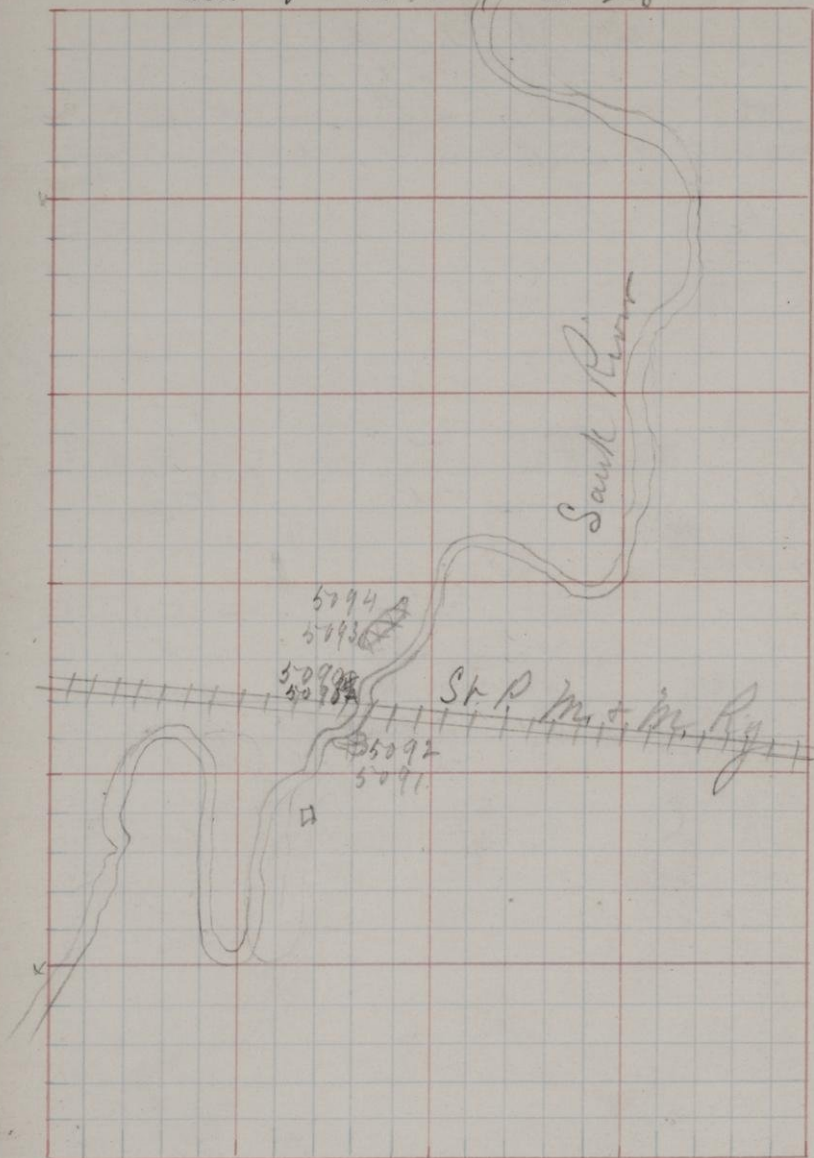
5088

750 ft; 60 m.

This seems to be a vein material in the
massive described under 5087 as the
mass of the quarry.

5089 was also taken from this ex-
pos-

Sec. 8 T. 124 R. 28



5090

750 N. 1200 W

Lies on the North west side of the Sand river, North of the Manitoba Ry and within 20 paces of the bridge at their intersection.

The rock has been quarried to some extent for building this & other bridges & with the exception of the not very large quarry hole it is covered with river sand & debris, which support a growth of moss & shrubs.

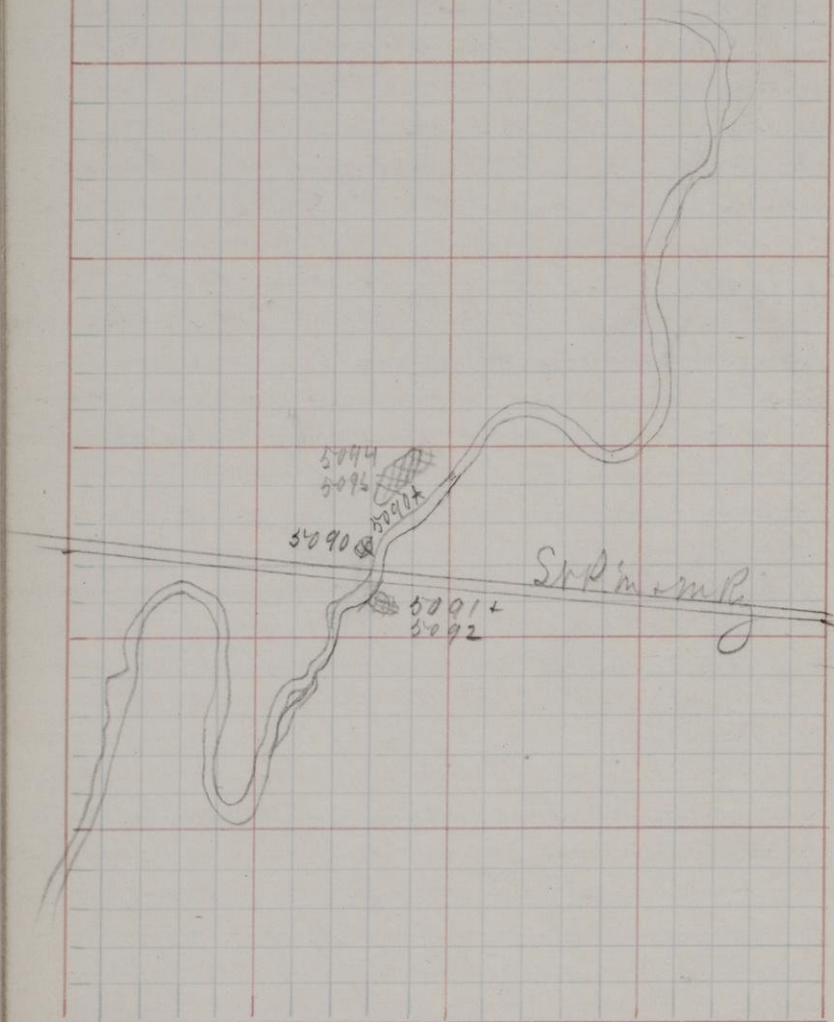
The rock is low - wholly below the Ry track; it is heavily jointed at 20° W with a dip of 82° to the west; at 73° E nearly perpendicular; at 23° W; etc.

No dikes were observed; but one or two of the seams contained a light-green, kaolin-like mineral of half an inch width, this occurred so far as seen in the joints at 73° E.

Quarrying was done along the at 20° W joints; these were the most conspicuous; they vary in distance apart from 4 inches to 4 feet.

The rock is rather fine in texture - as compared with other neighboring localities is of a pink color, very hard & fresh even to the surface & gives acidic rather than basic minerals, hornblende abundant in small quantity no accessories observed. As the rock weathers the hornblende seams first to disappear and leaves a skeleton of feldspar crystals covering the surface of the rock. Mica was not observed even on the weathered parts when it is usually seen.

Sec. 8 T. 124 R. 28



5090 A

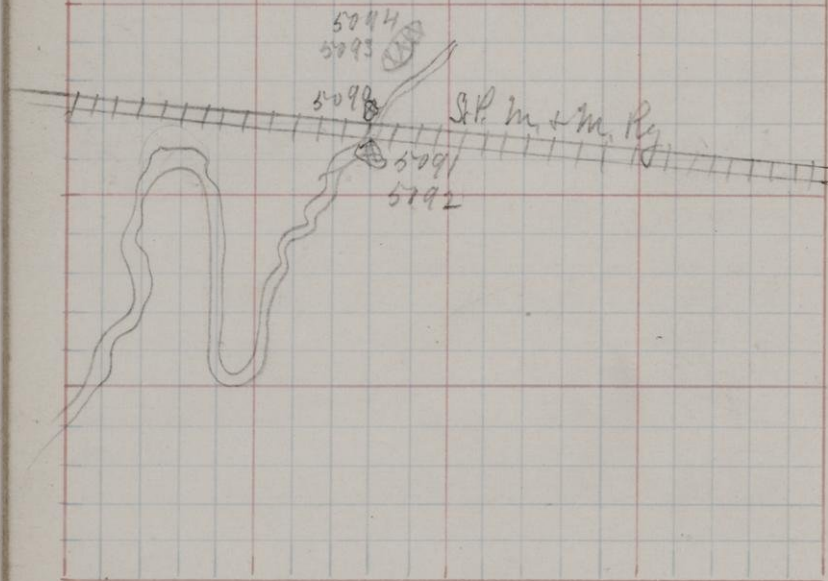
750 N; 1200 W

This is the material found in the seams of the joints running N 73° E

It looks + feels like an impure kaolin in some parts of the seams; in others more like the streaks, not veins, in the rock of Hiltunus Quarry on the West line of St Cloud no. 5039 A of the green color.

With the exception of this green + decomposed seam matter the rock of this exposure is quite fresh to the very surface. The surface was probably river worn instead of glaciated.

Sec. 8 T. 124 R. 28



600 N; 1200 W

On the opposite side of the railroad bridge & across the river is a low outcrop of two kinds of rock differing somewhat in texture & color. There are no doubt parts of the same area separated by the eroding of the river. This exposure is low, one half its surface being under the water of the river and the other half not reaching a greater height than 8 ft. It lies along the river bank some 50 paces. A little quarrying has been done.

The surface of the rock is smooth - river worn instead of glaciated as is shown by the narrow rounded grooves on the surface parallel with the jointing of the rock.

The joints run N 20 W with a dip W. of 82° . No dikes were observed.

The rock is porphyritic. A fresh fracture weathers in a year or two so that the feldspar crystals stand out clear & sharp thro' the bleached appearance they have taken on. After a long time the contact between the feldspar & the matrix become obliterated.

On the fresh fracture before the feldspars have begun to bleach the color is a ^{very} uniform red or pink, but older surfaces are mottled.

Quartz occurs in granules apparently segregated. Hornblende is present but proportion small.

Cavities in the surface suggest grooves once filled with crystals now weathered out.

Sec.

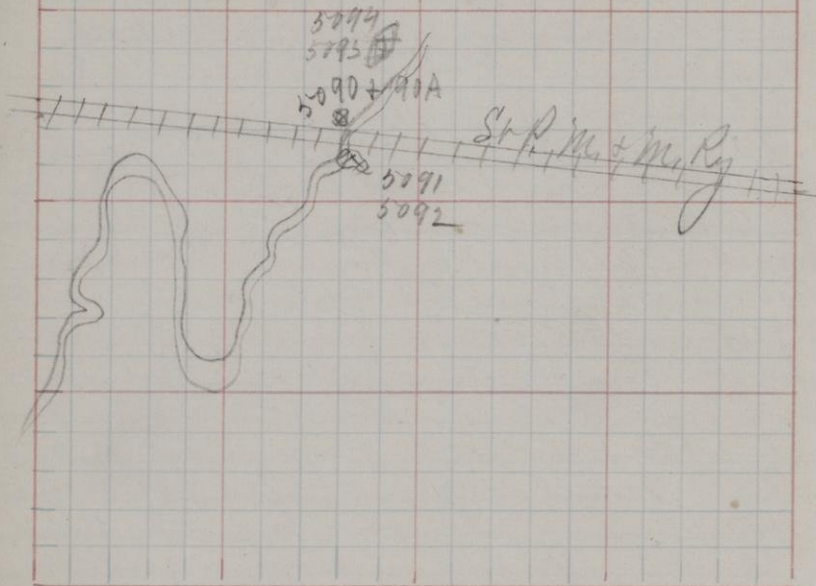
8

T.

124

R.

28



5092

26

600 N; 1200 W.

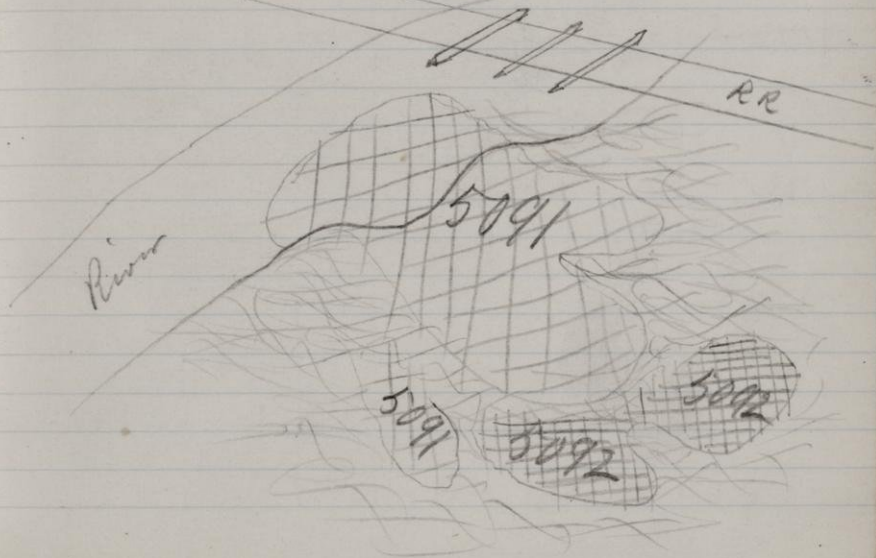
This sample is from another part of the same exposure as 5091. Its position with reference to that no. can be seen below.

The color is gray; texture is finer than 5091; it has both feldspar & quartz, mica appears in goodly quantity; it is not porphyritic.

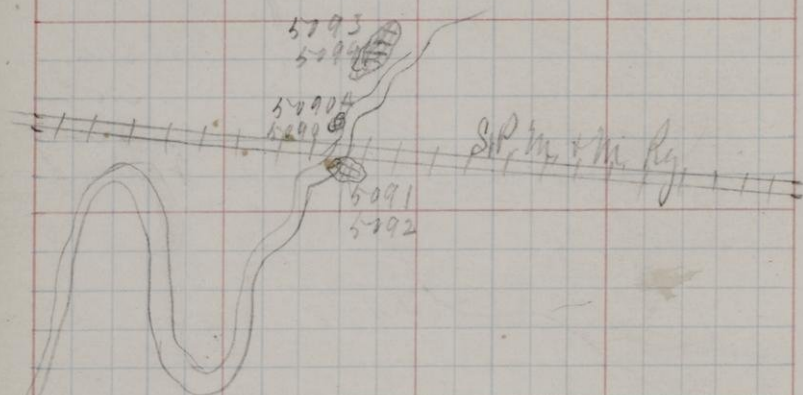
Zone N 20° W interrupted by N 70° E.

This rock seems only a knob in the mass of the exposure; it weathers to a lighter color showing streaks across the surface indicating harder masses & a coarser & a finer texture than the mass.

In weathering this no peels off in concentric layers in rather thin sheets.



Sec. 8 T. 124 R. 28



850 N; 1100 W

Probably a part of the exposure 5090 + A with the connecting rock covered by the river deposit. This outcropping at least 150 paces long is not high, no part of the ledge being over 4 or 5 feet high and its average width is not over 25 paces. The rock evidently extends into the bank disappearing as it does beneath a ridge covered with trees (marks N + S).

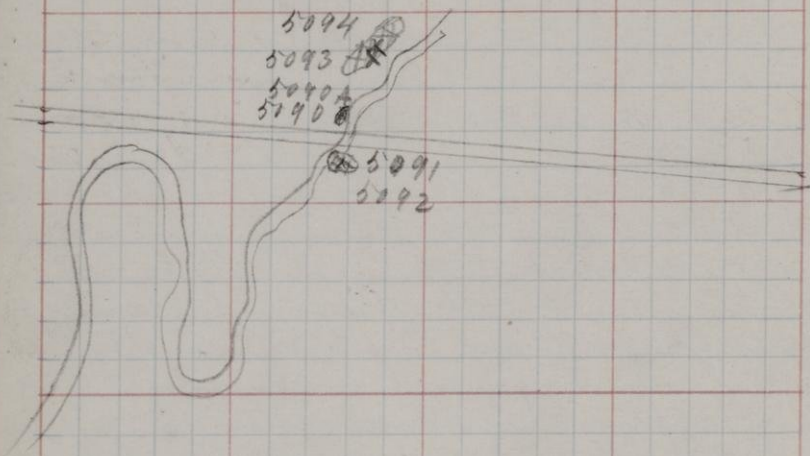
One series of joints dipped 85° to the W. In quarrying the rock puts of to the N + W at a dip of 20° .

No dikes were seen.

For the most part the ledge shows a gray surface on weathering but in some places it is brownish red like other localities already visited. Veins of a lighter color are frequent over the whole surface of this exposure. They are not wide.

The rock is gray in color; also porphyritic by the occasional occurrence of large feldspar crystals. Some of the feldspar crystals are tinged with brown wh. gives a dirty appearance. Other crystals are milky and still others are green - due perhaps to hornblende or chloritic inclusions. Some of them show any softening effects from weathering along the seams. Two or

Sec. 8 T. 124 R. 28



5093. — 850 ft; 1100 m.

these specimens are sent taken from the bed of the quarry to show the incipient stages of weathering which seems to be accompanied by a blackening of the hornblende + a whitening of the feldspar.

Only a few granules of quartz were noted + these were small.

Mica + hornblende were both present; intermingled + often segregated in nodular masses.

5094.

is a modification of 5093.

It occurs in masses — sometimes apparently in veins in the latter. The spot where the specimens were taken is at the top of the quarry in a belt a foot or more across + extending under the soil. It weathers smooth + on the face of the quarry it disappears downwards by branching.

The color distinguishes it sharply from the mass of 5093 — this being of a reddish brown tint with many blotches, some of a dark + others of a lighter color. The reddish brown seems to be a matrix of rather fine texture for the feldspar which is partly porphyritic.

Quartz is sparingly present in small granules. Hornblende + mica both present — the latter not abundant. An accessory or a fine "Old Gold" powder occurs in a few small cavities on two or three of the pieces.

Sec. 17 T. 124 R. 28

5096



5095

5097

5095

750 ft; 1750 W.

This is the quarry rock at the Evans & Quarry. It lies 250 paces E of the E line of the $\frac{1}{4}$ of Sec.

The East face is a cliff 50 feet high
 joints $\pm 25^\circ E$; $\pm 20^\circ W$; $\pm 55^\circ W$; etc.
 All are nearly vertical. The surface is
 glaciated, from the top which is the highest
 point on this Sec. a fine view shows a
 wooded country for some distance around
 except where farms are cleared.

This rock constitutes the main mass
 of rock at this quarry. It is a coarse
 red hornblende granite very like that
 at Lewis quarry on the Section South
 of this ± 5068 . The feldspars are colored
 with ferric oxide which has no doubt
 in the fractures & cleavage planes, tho
 the coloring appears to be distributed
 in a very uniform manner.

Quartz is present in granules distributed
 among the feldspar crystals, which latter
 appear for the most part to be ortho-
 class.

Hornblende + mica are both present
 Accessories not observed in a
 marked quantity.

Sec. 17 T. 124 R. 28

5096



5095

5097

5096.

800 ft; 1950 W.

This sample was taken about 200 paces West of 5095. The rock had been quarried slightly at this locality.

The surface was so covered with a growth of trees that no relations which this might bear to #5095 were to be seen. No contacts were observed between the two.

The joints seem to run parallel with them on 5095.

This rock is dark, rather fine and indeed finer than the rock of similar color from some of the sections in the southern part of the town.

The feldspar seems to be trichitic & a large part of the amphibole mineral is replaced by black mica.

This mineral looks much like the rock on Section 19 Cold Spring tp. which we called provisionally *Mica Diorite*.

This has about the same texture & hardness.

Sec. 17 T. 124 R. 28

5096

5095

5097

5097:

660 N 1800 W.

This Specimen represents the rock at the main quarry on this $1/4 \times 1/4$ Sec 17, and is located on the South Side of the Exposure. The

Woods surrounds the ledge on all sides and covers it for much of its area.

Joints N 25° W with a dip SW 75°
N + S dip 80° S

There is an apparent bedding with a dip of 15° or so to the N + E

This exposure shows a quarry wall 15 or so feet high. It is continuous with the wall on the E Side where 5095 was taken.

The rock is a coarse gray and quite fresh hornblende granite. The feldspar is red towards the surface and the deepest parts of the quarry show a tendency towards whiteness.

Much has been taken from this place for monuments and this is claimed to be one of the best of Monimental granites.

No tendency to gneissic structure was seen.

