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Mich. Gogebic Dist, 1915: [specimens 77297-77616]. No. 475 Sept. - Oct. 1915

Lewis, Harman

[s.l.]: [s.n.], Sept. - Oct. 1915

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FIELD SECTION BOOK

#415

Lewis's Notes Sunday Lake

Sept-Oct. 1915

Notes on Second Quartzite Knob East of Sunday Lake.

Paces from N. edge	Description of rock.	Dip of beds.	Notes.
0 to 50	banded grayish quartzite, the massive bands varying in thickness from fraction of inch to one foot and separated by thin shaly partings	52° N. to 54° N.	Cross-bedding shows top to N. At 40 paces - reversed cleavage in slate band. Specimen A-50 taken from north edge. (77297)
50 to 70	same except that bands are finer, being mostly less than 1" thick.	54° N. to 53° N.	Cleavage reversed with practically no pitch.
70 to 90	Same with larger proportion of slate containing bands and lenses of fairly coarse quartzite	53° N. to 48° N.	Cleavage reversed with practically no pitch. At 85 paces there is a slight break as in sketch →  At 87 paces Specimen A-51 was taken. (77298)
90 to 98	Chiefly banded slate with lenses and bands of coarse quartzite, a few of latter up to 1 ft. thick.	48° N. to 56° N.	cleavage reversed with slight pitch to east.
98 to 133	Same	56° to 57° N.	At 123 paces - a slaty phase.
133 to 143	Chiefly red, banded, somewhat siliceous slate	57° N.	Reversed cleavage with very slight pitch to east. Several slight faults (of few inches) along cleavage planes where N. side upper side
143 to 160	Banded slate & fine grained quart-		

June 24, 1915 Wakefield, Mich.

In the afternoon I paced across the second quartzite knob east of Sunday Lake and took the notes on opposite page.

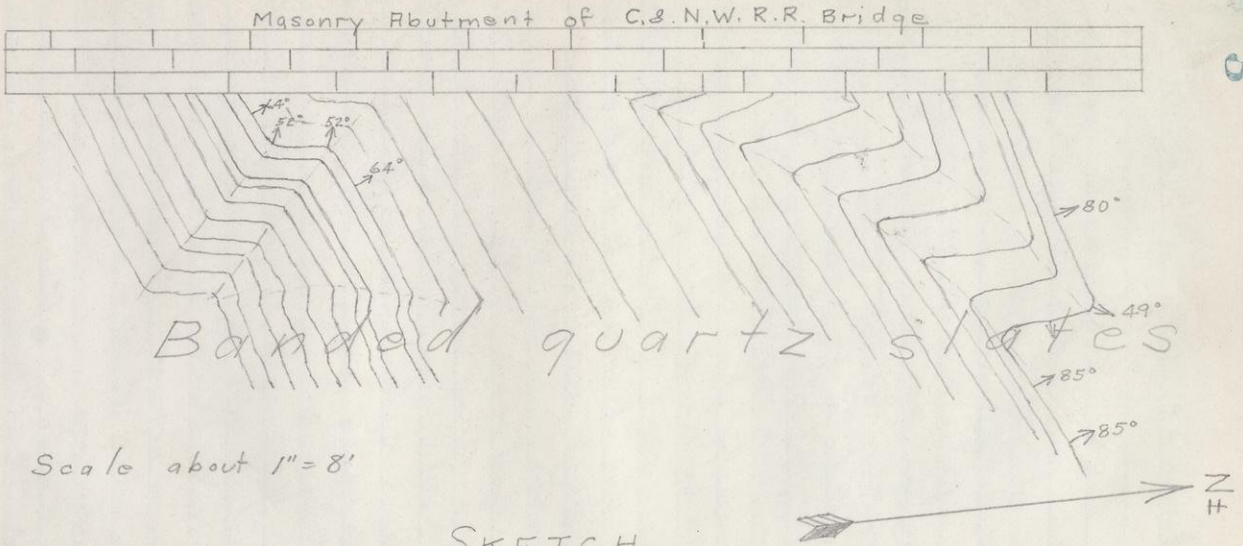
77297 ~~A-50~~ Specimen A-50 is from the upper horizon. A-51 is 87 paces farther south

77298 ~~A-51~~

While the beds dip about 54° N. the cleavage has only a slight northward dip or is nearly flat in more massive beds and the pitch of the cleavage (i.e. the intersection of the cleavage & bedding) is either flat or very slight to the east.

77299 ~~A-52~~ Specimen A-52 is from the greenstone ledge at the S. base of the quartzite hill just east of Sunday Lake. Cross-bedding in this hill shows top to north.

Just east of the second knob referred to on opposite page is a third knob where the outcrop runs much further south giving a total of 344 paces across the outcrops. Crossbedding shows top to north. All cleavage reversed. Very little drag folding except one or two places where N-side has gone up - thus with slight pitch east.



SKETCH
of
HORIZONTAL SURFACE OF OUTCROP
AT C.&N.W.RR. BRIDGE
Ramsy, Mich.

Eureka Mine
N-S Vertical Projection of No. 3 Sh.
Scale 1" = 200'

June 25, 1915. Ironwood, Mich

Eureka Mine

77300 A-53 Granite from north edge of
77301 A-54 outcrop just south of office.
Dike at end of 19th level
x-cut north from shaft.

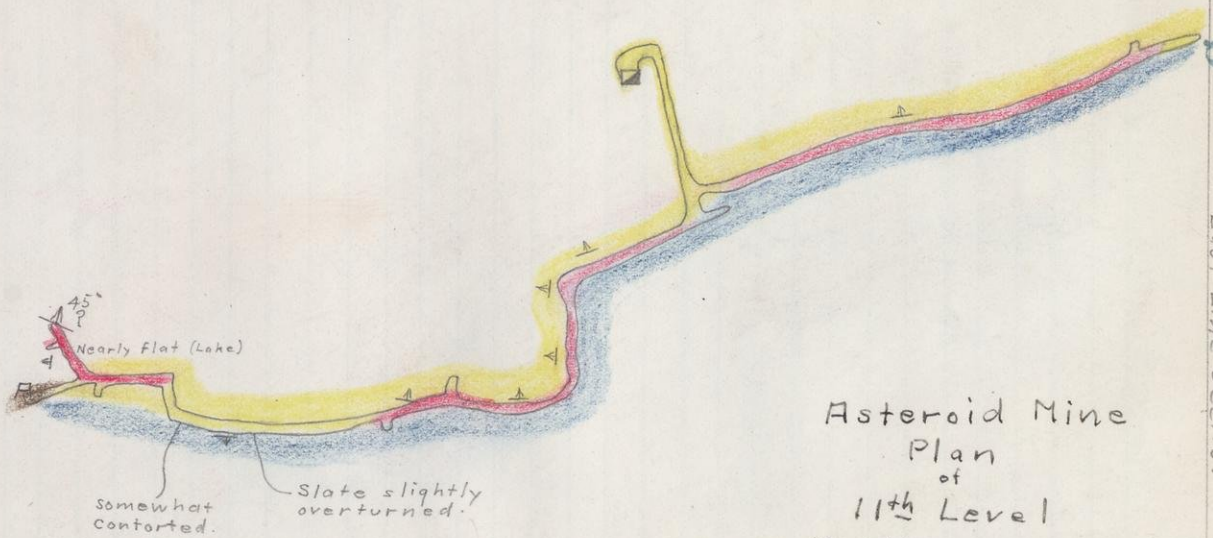
←——————→

77302 A-55 A-55 is from the greenstone
outcrop just south of the
77303 A-56 Wakefield station and A-56
from a dike that cuts the same.

77304 A-57
77305 A-58 A-57 and A-58 are from
the gray slate formation near
the No. 3 shaft 18th level of
Eureka mine.

77306 A-59 A-59 is also from the con-
torted slate series at No. 3
Shaft 18th level Eureka, but
is probably interbedded sill
about 1 foot thick

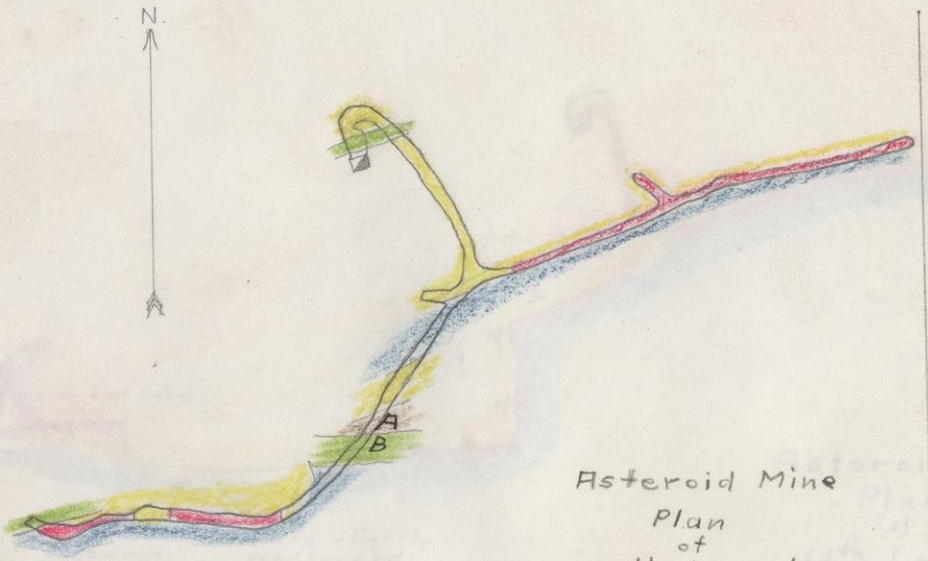
400' S. of
N.E. cor. Sec. 13.



East Line Sec. 13.

Asteroid Mine
Plan
of
11th Level

Elevation = -1060'
Scale - 1" = 200'



This point is 900' S. of N.E. cor. Sec. 13.

East L/ns @ Sec. 13.

Asteroid Mine

Plan

of

10th Level

Elevation = -954'

Scale = 1" = 200'

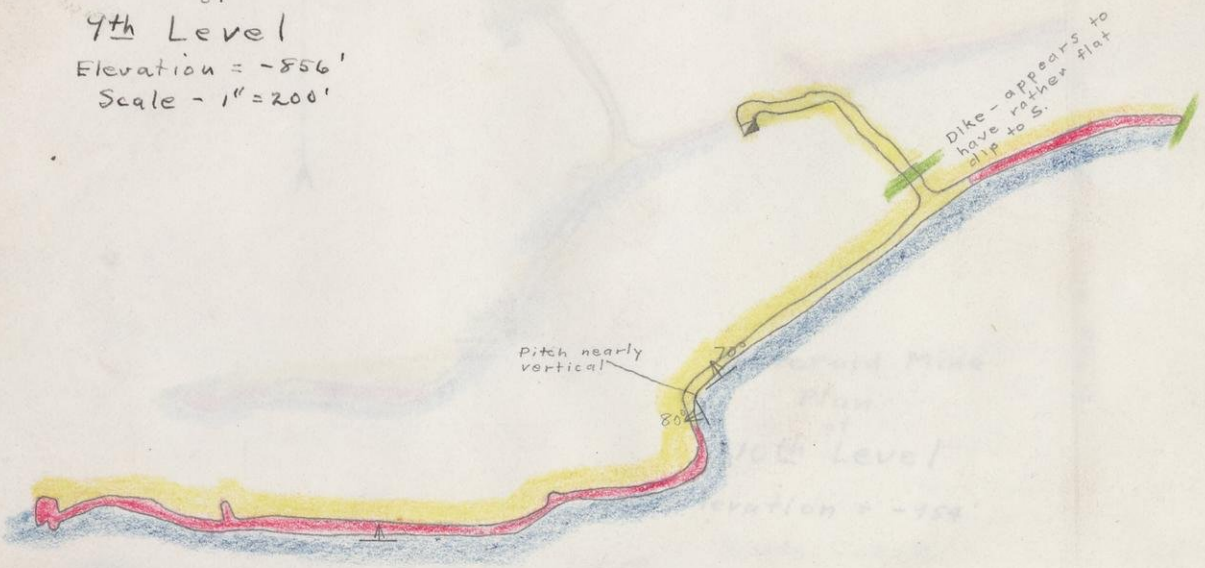
Asteroid Mine
Plan
of
4th Level

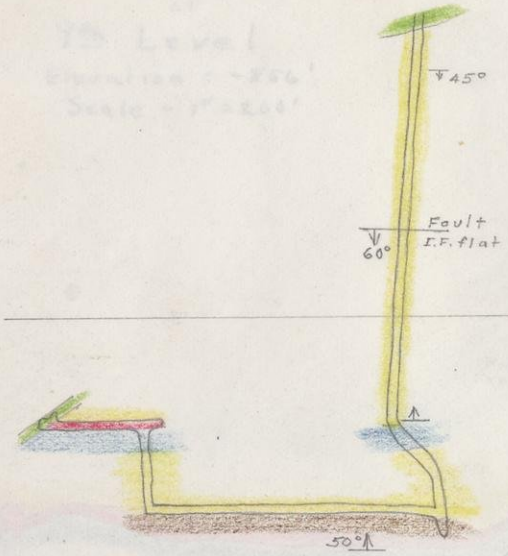
Elevation = -856'

Scale - 1" = 200'

This point is 400' S. of N.E. cor. Sec. 13

East Line Sec. 13.





East Line Sec. 13

E-W ¼ Line

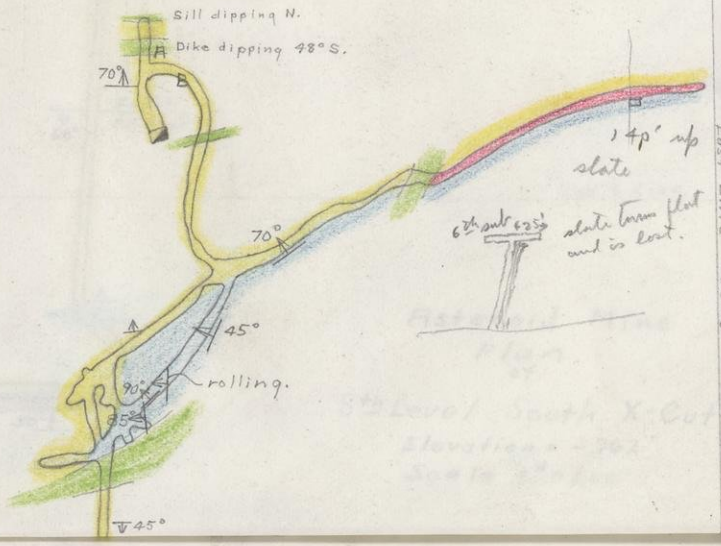
1320' S. of N.E. cor. Sec. 13

Asteroid Mine
Plan
of
8th Level South X-Cut

Elevation = -762'

Scale 1" = 200'

Asteroid Mine
Plan
of
8th Level
Elevation = -762'
Scale 1" = 200'



This point is 400' S.
of N.E. cor. Sec. 13

East Line Sec. 13

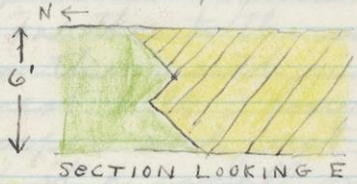
Asteroid Mine
Plan
of
6th Level
Elevation = -570
Scale 1"=200'

This point is 400' S of N.E. cor. Sec. 13.

East Line, Sec. 13.

June 26th Ironwood, Mich.

Asteroid Mine,
8th Level - At the point A (see map) the contact of the dike and I.F. on the east face of the X cut looked as follows :-



SECTION LOOKING E

At the point B the west face of the X cut showed a small drag fold as follows :-

SECTION LOOKING W.

7307 ~~A-60~~ 10th Level - at the point marked A I took specimen A-60 which I thought to be the foot quartzite coming in just below the dike However on examination in daylight it looks very ferruginous; but I believe it is probably the beginning of the quartzite.

7308 ~~A-61~~ A-61 is from the dike at B.

11th Level - At the point marked A (see map), at west end of west drift I took a specimen of

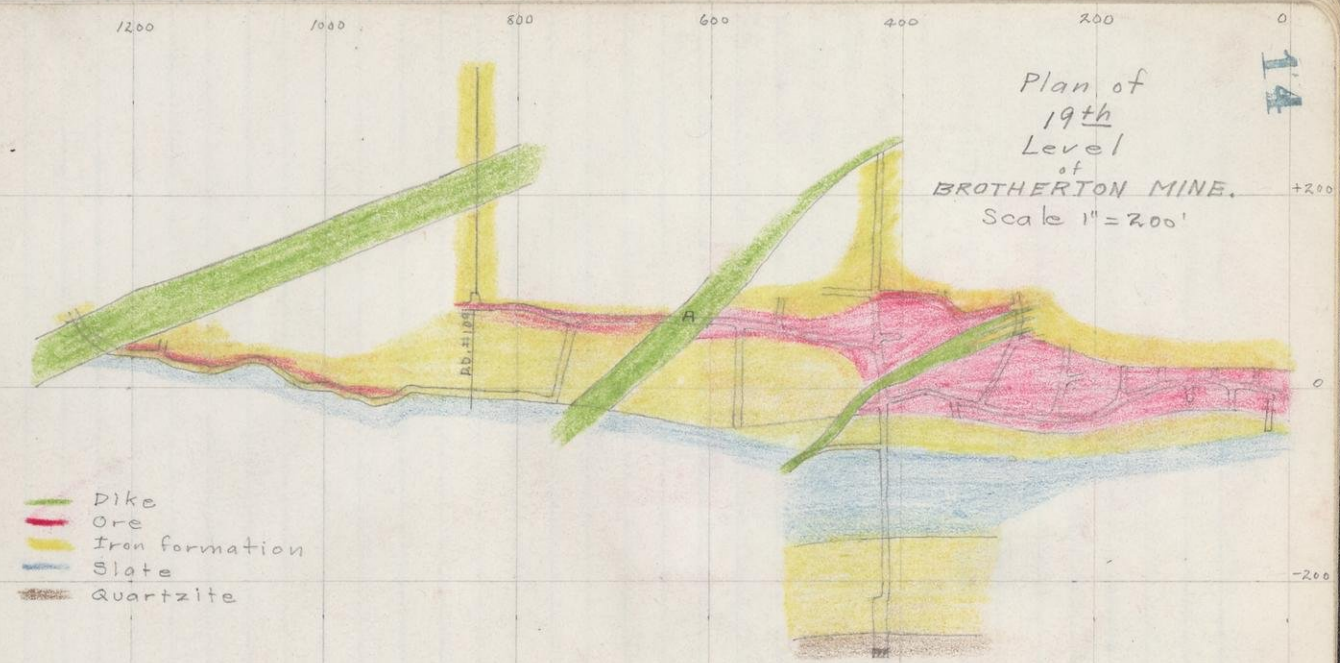
7309 ~~A-62~~ the quartzite, A-62.

In the afternoon I walked over the hill north of the Mikado mine and on the north slope which is quite steep I found chert dipping down the slope. A-63 is a specimen of this.

A-63
77310

Farther to the northeast on the north side of the next hill I found a pit in jasper and just to the south of it a small outcrop of black gray slate. A-64 is from the jasper and A-65 from the slate.

77311
A-64
A-65
77312



Plan of
19th
Level
of
BROTHERTON MINE.
Scale 1" = 200'

14

15

Vertical Cross Section through Clark Shaft - Brotherton Mine Wakefield - Michigan.

A-66
77313

7731
A-6

June 27, 1915 Ironwood, Mich.

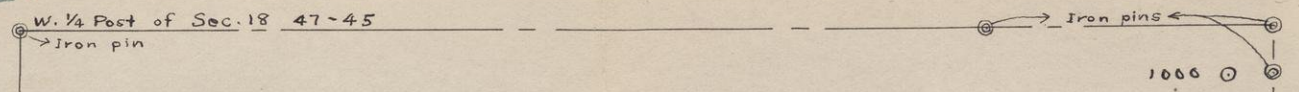
I visited the Brotherton mine 19th & 23rd levels. On the 19th the shaft is in quartzite and the main cross-cut passes northward thru lean I.F. and then slates into the ore bearing I.F. I paced off 40 paces of slate and 42 paces of lean jasper between the slate and quartzite. At a dip of 60° this would mean a thickness of about 85 feet of slate and 90 feet of jasper.

At the point A (see plan of 19th level) I took specimen
~~A-66~~ A-66 of the dike rock.
77313 Royce states that there is usually a band of lean I.F. between the ore and footwall slates and that crooked or wavy dikes seem to have a greater concentrating power than straight ones.

The cleavage in the slates is reversed.

On the 23rd level I found that the slates between the two dikes have a rather flat dip eastward throughout part of the
77314 cross-cut.
A-67 A-67 is from the foot quartzite.

17



N.W. Forty of S.W. 1/4 of Sec. 18 47-45

showing location of

D.D. Holes 1000 & 1001

furnished by R.S. Rose June, 1915.

June 28, 1915 Ironwood, Mich.

I spent most of the day with Royce going over the Brotherton and Mikado material. Royce says that there is a jasper formation between the foot quartzyte and slate.

June 29, 1915 Marquette, Mich

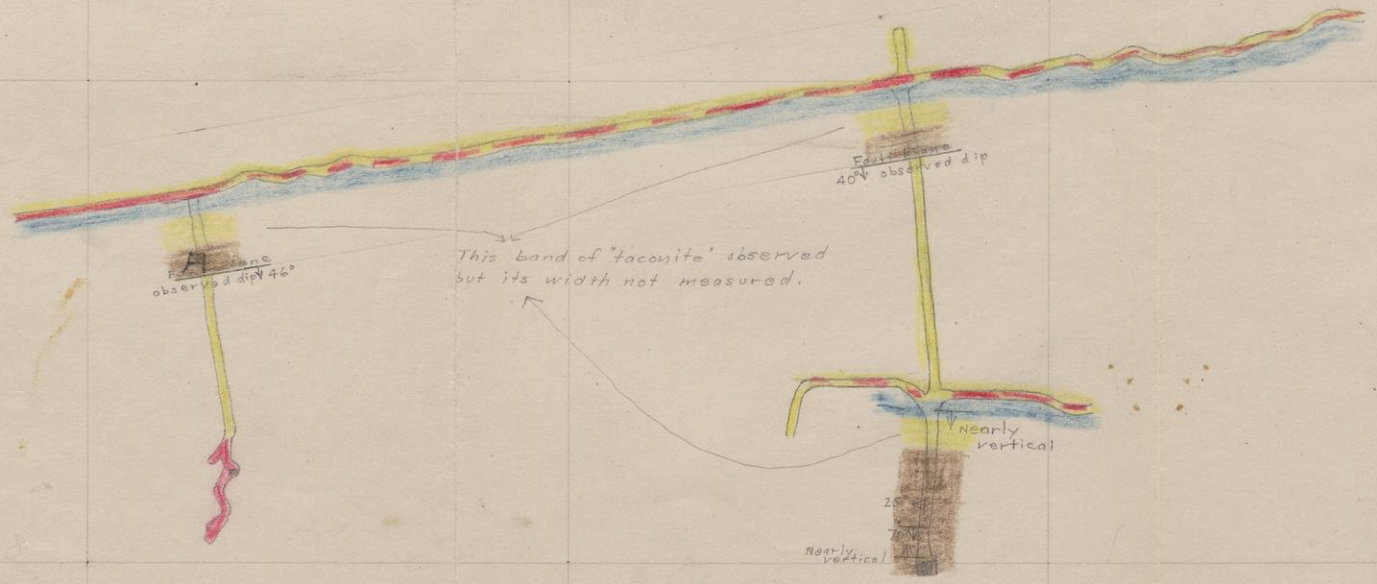
Rose went over the situation at the Wakefield mine with me.

EUREKA MINE

Plan of
1650 ft. Level
1" = 200'

20

EUREKA MINE
Plan of
15th Level
1" = 200'



3000

2500

11 12
14 13

2000

2500

2000

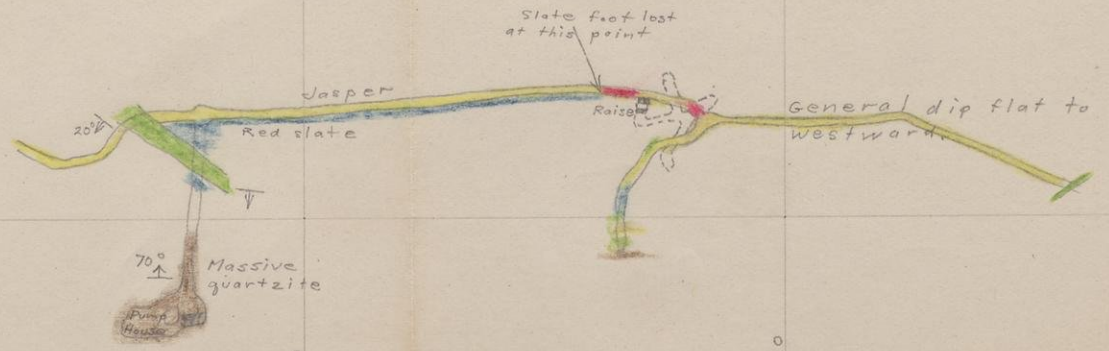
1500

1000

21

EUREKA MINE.
Plan of
12½ Level
1" = 200'

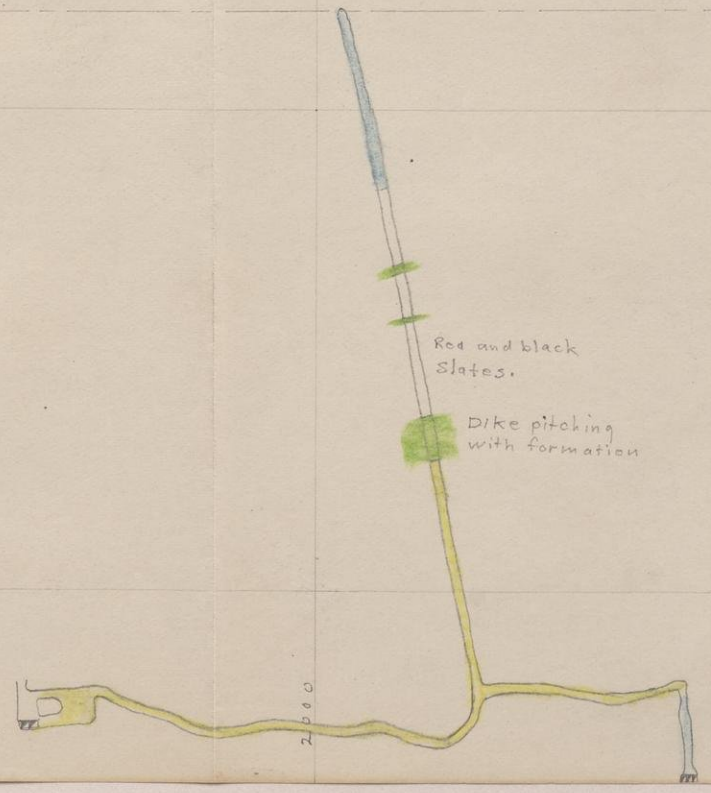
11 12
14 13



2500
2000
1500
1000

22

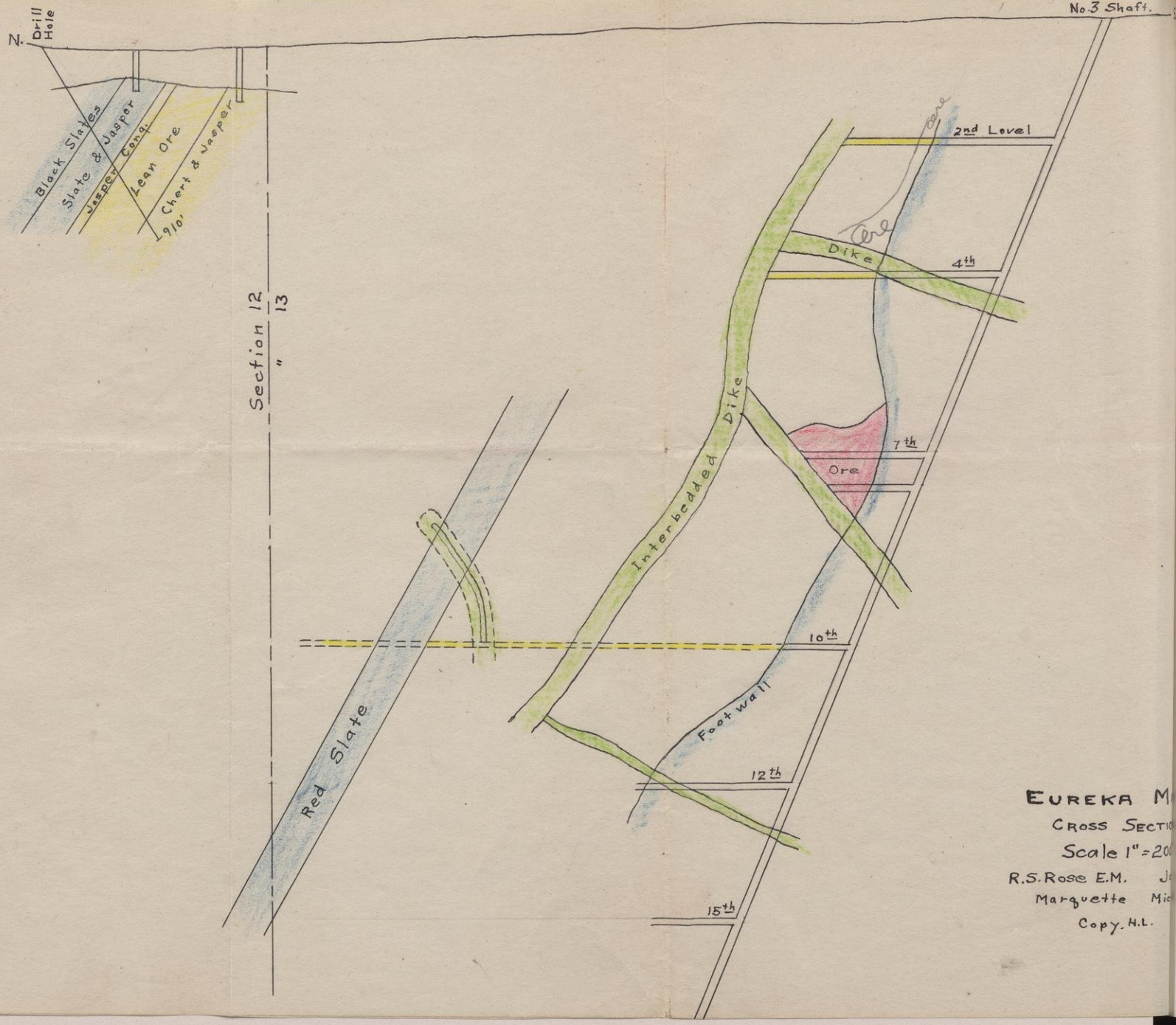
EUREKA MINE
Plan of
10th Level
1" = 200'



EUREKA MINE
Plan of
8th Level.
1" = 200'

11 12
14 13

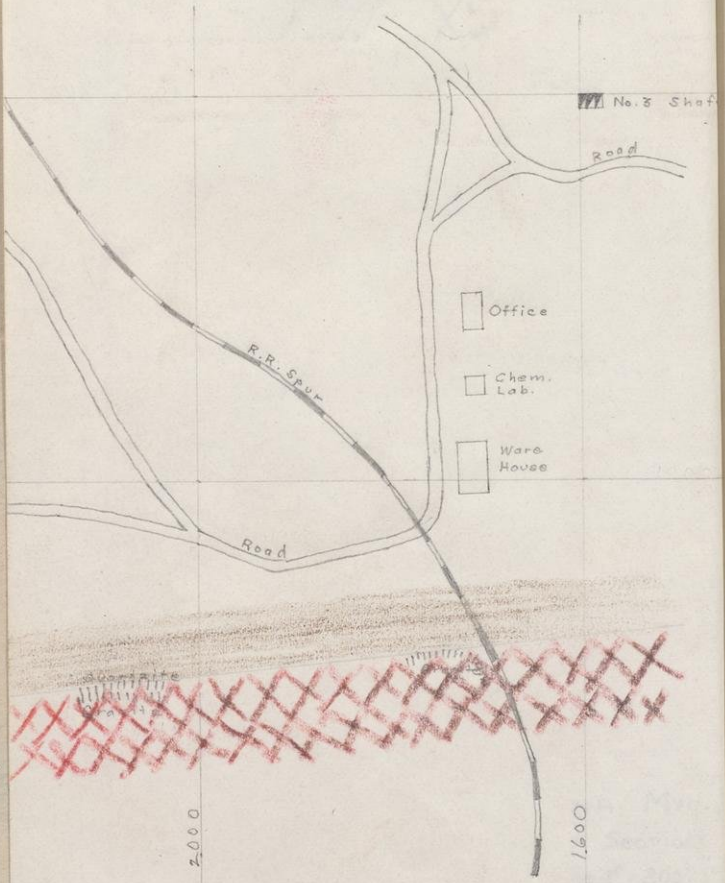
3000
2500
2000
2500
2000
1500
1000



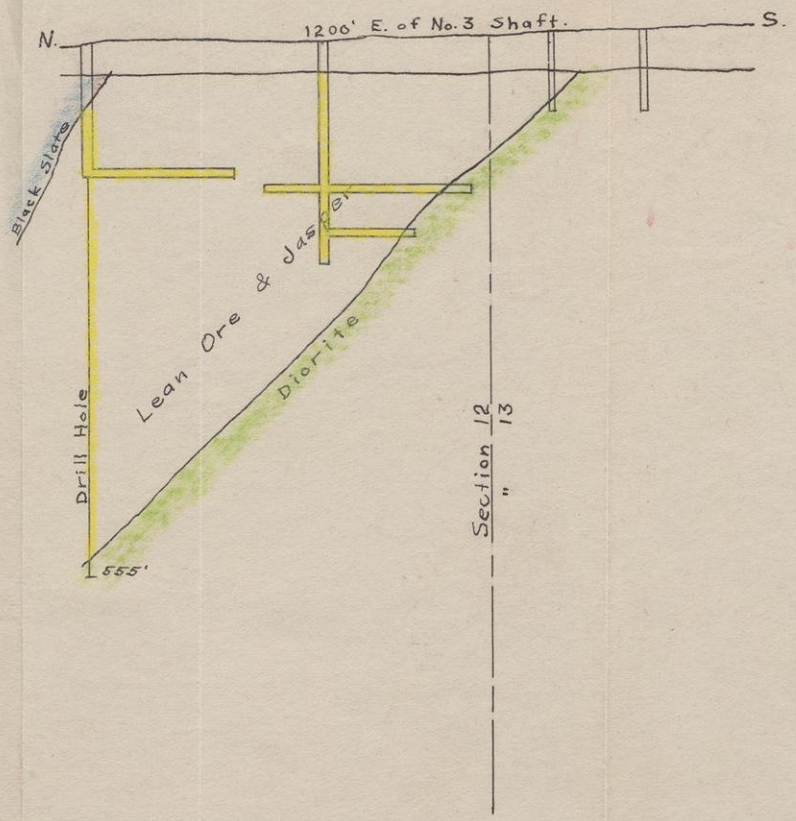
EUREKA M
CROSS SECTIO
Scale 1" = 20
R.S. Rose E.M. J
Marquette Mic
Copy. H.L.

Eureka Mine

Map showing
Relation of No. 3 Shaft
to
Quartzite-Granite Outcrop
Scale 1" = 200'



coordinates refer to Center
of Sec. 13.



EUREKA MINE
CROSS SECTION
Scale 1" = 200'
R.S. Rose E.M. Jan. 1912.
Marquette Mich.
Copy H.L.

June 30, 1915 Ironwood, Mich.

Eureka Mine

By pacing I located the granite outcrops south of the Eureka mine, the two outcrops being shown on accompanying map. At the westernmost of the two outcrops, I found the northern face plastered with the typical fine-grained siliceous slate of the Huronian. Specimen
77315 A-68 A-68 is from the contact. A-69
~~A-68~~ is a piece of the granite a
~~A-69~~ foot or so to the south of the
77316 contact. By using the location of this contact with respect to No. 3 Shaft and Roe's cross-section thru No. 3 (see opposite page) it appears that the basal quartzite has a thickness of
77317 about 600 feet.
~~A-70~~ A-70 is from the dike at the
77318 east end of the 12th level.
~~A-71~~ Specimen A-71 is from the quartzite just north of fault at point marked A on plan of 15th level

The fault on the 15th level is very plain, being marked not only by the shear zone but also by the existence of quartzite on one side and iron formation on the other. It is interesting to see that

the observed dip of 40° coincides almost exactly with the dip obtained by connecting the points where the fault cuts the 15th and the 1650 ft. levels.

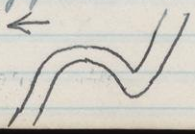
On the east drift of the 1650 ft. level the slate foot is lost (see plan) and apparently thrown to the south, it being found again farther along the drift to the southeast where it dips to the southwest, probably overturned.

~~H-72~~ 77319 Specimen H-72 is from the iron formation at about the point A (see plan of 1650 ft level).

I took pains to check up the existence of the band of "taconite" between the quartzite and red foot slate and found it present in every case that I visited although I did not have time to measure its thickness.

On the 15th level the quartzite near the shaft shows signs of folding as indicated on the map. It is not unlikely that this folding would appear in section as follows:

N ←



being a drag fold pitching westward;

for this would account for fact that the slate foot is thrown southward on the first west drift.

77320
A-73 A-73 is a piece of core, representative of dike down to depth of 385 feet Hole 4 located 615' S. 631' W. of E ¼ post on N.E. ¼ Sec. 13-47-46.

July 1, 1915 Ironwood, Mich.

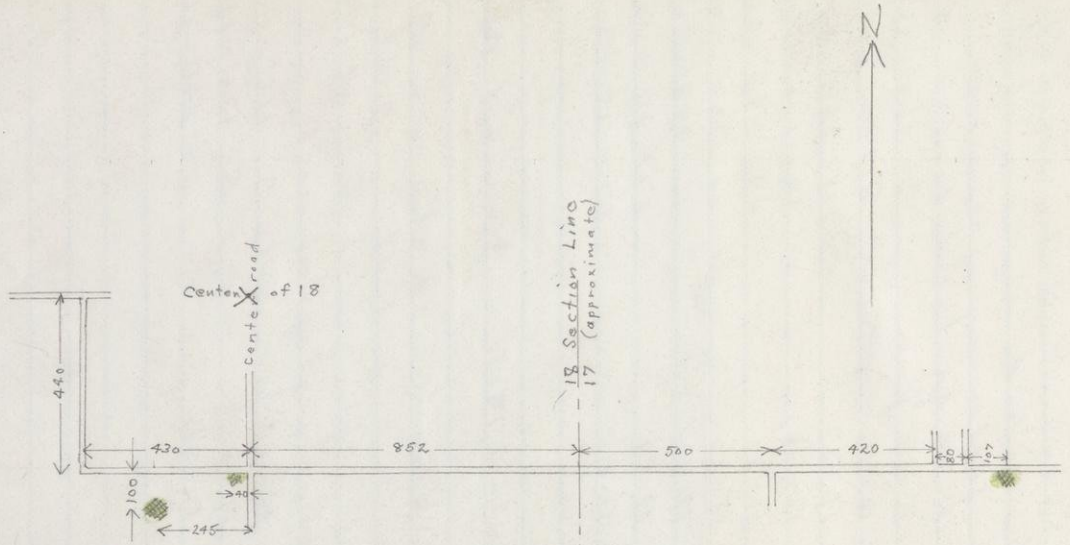
I examined the cores at the Mikado mine and took the following specimens.

77321	A-74	from	Hole 6	250'-295'
77322	A-75	from	" 7	225'-260'
77323	A-76	"	" 8	106'-116'
77324	A-77	"	" 11	385'-435'
77325	A-78	"	" 14	130'-161'
77326	A-79	"	" 14	385'-470'
77327	A-80	"	" 14	730'-745'
77328	A-81	"	" 16	198'-212'
77329	A-82	"	" 17	10'-15'
77330	A-83	"	" 17	25'-30'

July 2, 1915 Ironwood, Mich.

I examined the cores of the Mikado drilling at the Carp office and took the following specimens.

77331	A-84	from	Hole 2	118'-132'
77332	A-85	"	" 5	130'-145'
77333	A-86	"	" 5	246'-369'



Sketch
Showing Greenstone
Outcrops
along
Wakefield Road

Measurements in paces
1 pace = 2.92 feet
= Greenstone outcrops.

July 3rd, 1915 Ironwood, Mich.

I examined the Wakefield Drilling records. The following specimens were furnished by Mr. R.S. Rose.

77334	A-87	from	Hole	106 - 280'
77335	A-88	"	"	120 - 273'
77336	A-89	"	"	121 - 280' - 285'
77337	A-90	"	"	122 - 460' - 465'
77338	A-91	"	"	124 - 215' - 220'
77339	A-92	"	"	132 - 235' - 236'
77340	A-93	"	"	136 - 185' - 186'
77341	A-94	"	"	137 - 85' - 90'
77342	A-95	"	"	158 - 430'
77343	A-96	"	"	158 - 440'
77344	A-97	"	"	400 - 130' - 135'
77345	A-98	"	"	402 - 150'
77346	A-99	"	"	404 - 135' - 140'
77347	A-100	"	"	404 - 280'
77348	A-101	"	"	405 - 80' - 85'
77349	A-102	"	"	407 - 90' - 95'
77350	A-103	"	"	1000 - 55' - 58'
77351	A-104	"	"	1000 - 65' - 68'
77352	A-105	"	"	1001 - 75' - 80'
77353	A-106	"	"	500 - 80' - 85'
77354	A-107	"	"	500 - 140' - 145'
77355	A-108	"	"	500 - 265' - 270'

= Greenstone outcrops.

along Wakefield Road

July 11, 1915 Butte, Montana.

Uglow and I visited the Pittsmont Mine. The ore is chiefly enargite and chalcocite, occurring in veins and mineralized zones in the Butte granite. A separation is made into two grades, the first class going directly to the smelter and the second class going first to the concentrating mill. The division depends not only on the percentage of copper but also on the amount of Fe; for the iron fluxes the silica making the ore more easily smelted. The mill recovery is about 75%. The dividing line between 1st and 2nd class ore varies from 3 to 6 % Copper depending on the iron content.

July 12, 1915 Butte, Montana

I visited the Elm Orlu mine with Uglow where we saw the "Winchell stope", the ground under controversy with the Butte & Superior. This body of ore is about 200 feet wide from north to south and pitches eastward into the Butte and Superior. Throughout this 200 feet the ground varies in richness from practically solid sphalerite to merely veinlets & replacements in the granite. Granite forms the two walls of the ore. The gangue is chiefly silica having a cherty appearance and less commonly kaolin formed by the alteration of the granite.

The following specimens are from the Elm Orlu mine.

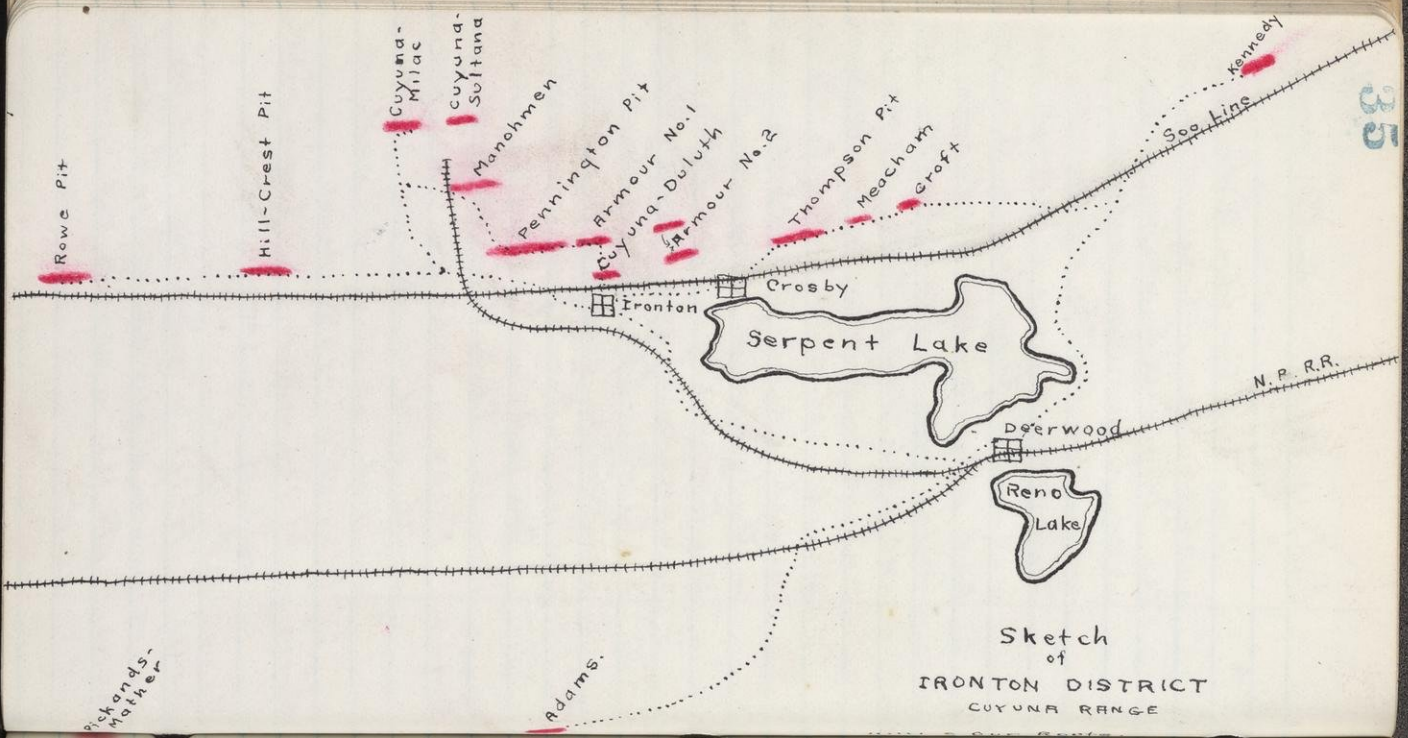
77356 ~~A-109~~ A-109 is granite from the south wall of the big zinc ore body at the east end of Elm Orlu - 13th level.

77357 ~~A-110~~ A-110 is granite from north wall of big zinc deposit on 13th level.

77358 ~~A-111~~ A-111 is zinc ore from con-

77359 ~~A-112~~ troverted ground of 13th level.

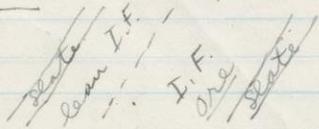
A-112 is copper ore from 15th level.


Rowe Pit
Hill-Crest Pit
Cuyuna-Milac
Cuyuna-Sultana
Manchmen
Pennington Pit
Armour No. 1
Cuyuna-Duluth
Armour No. 2
Thompson Pit
Meacham
Croft
Soo Line
Kennedy
Ironton
Crosby
Serpent Lake
N. P. R.R.
Deerwood
Reno Lake
Pickands-Mather
Adams
Sketch
of
IRONTON DISTRICT
CUYUNA RANGE

Aug. 16, 1915 Ironton, Minn.

Harder and I made an all day auto trip, the route of which is shown on the opposite page. At the Thompson Pit the section is as follows:

S ←



The silica in the lean ore is in the form of a very fine powder, a disintegration product of the chert.

IRONTON DISTRICT
CUYUNA RANGE

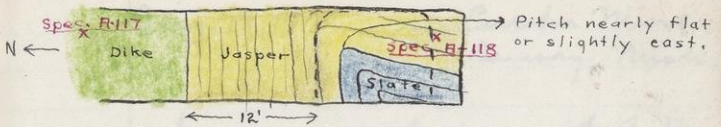
Asteroid Mine
Plan
of
6th Level
Elevation = −570
Scale 1" = 200'

This point is 400' S. of N.E. cor. Sec. 13.

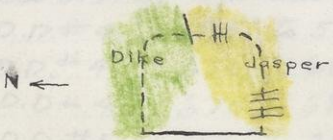
32

East Line Sec. 13.

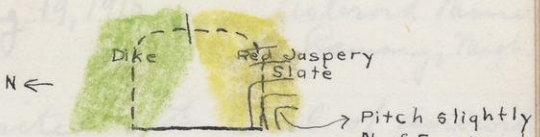
N



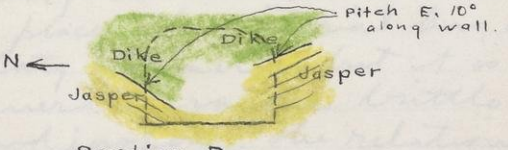
Section A.



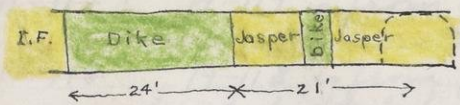
Section B



Section C



Section D



Section E

Vertical N-S Sections
on 6th Level
Asteroid

Aug. 18, 1915 Eureka Mine
Ramsay, Mich.

I examined cores of Asteroid drilling and took the following specimens.

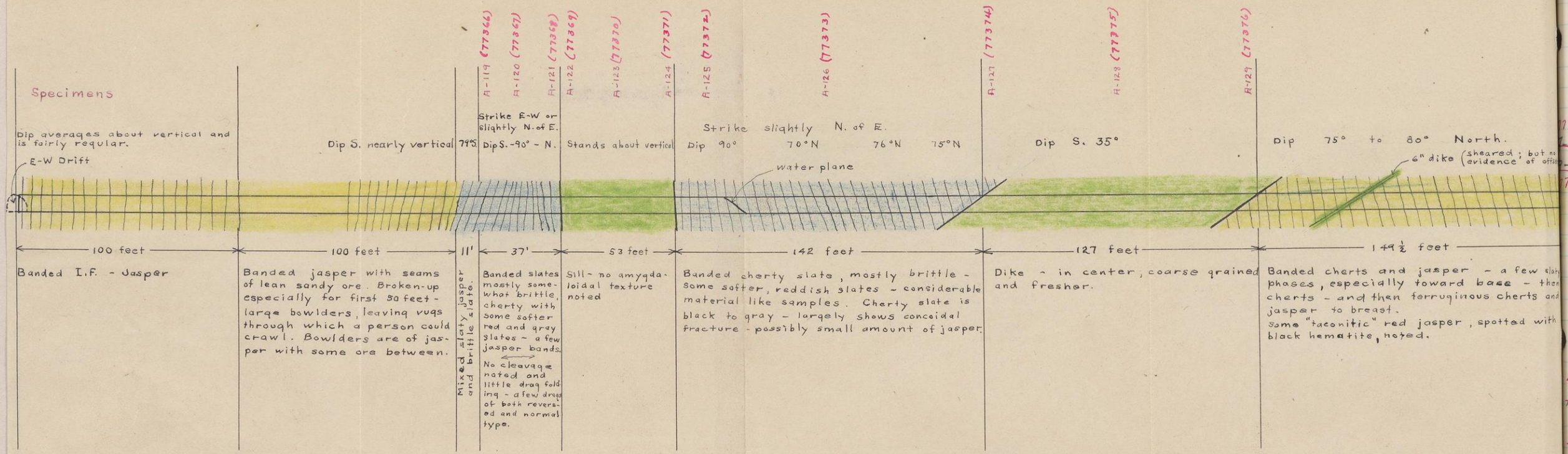
77360 A-113 D.D.#4 - 495' to 500' - jasper
77361 A-114 D.D.#4 - 650' to 660' - "taconite"
77362 A-115 D.D.#4 - 670' to 680' - "
77363 A-116 D.D.#5 - 255' to 260' - I.F.

Aug. 19, 1915 Asteroid Mine
Ramsay, Mich.

Visited 6th level of Asteroid Mine. It is difficult to say whether the true foot had been found on the south. In places the material has a slaty character but it is generally rather brittle and jaspery. The relations of the dike rock are hard to determine.

77364 A-117 A-117 is from dike at east cross-cut - see Section A.
77365 A-118 A-118 is from jasper at end of east drift before cross-cutting north - see Section A.

We also visited 5th level north x-cut which went through big sill - but x-cut is dammed up so that we saw only beginning of sill.



SECTION OF NORTH CROSS-CUT

1650 ft. Level

EUREKA MINE.

Scale - 1" = 50'

Aug. 20, 1915 Eureka Mine
Ramsay, Mich.

I visited the north cross-cut on the 1650 ft. level of the Eureka and made the section on opposite page.

77366 to ~~A-119 to~~ A-129 77376 Specimens A-119 to A-129 are located on cross-section on opposite page.

On the 1650 ft. level I measured the thickness of the red slate & "taconite" just south of the main E.-W. drift. The bedding is about vertical or perhaps very steep to the south. There is 22 feet (horizontal) of the red slate of which A-130 is a specimen and 12 feet of "taconite" of which A-131 is a specimen

77377 A-130 77378 ~~A-131~~

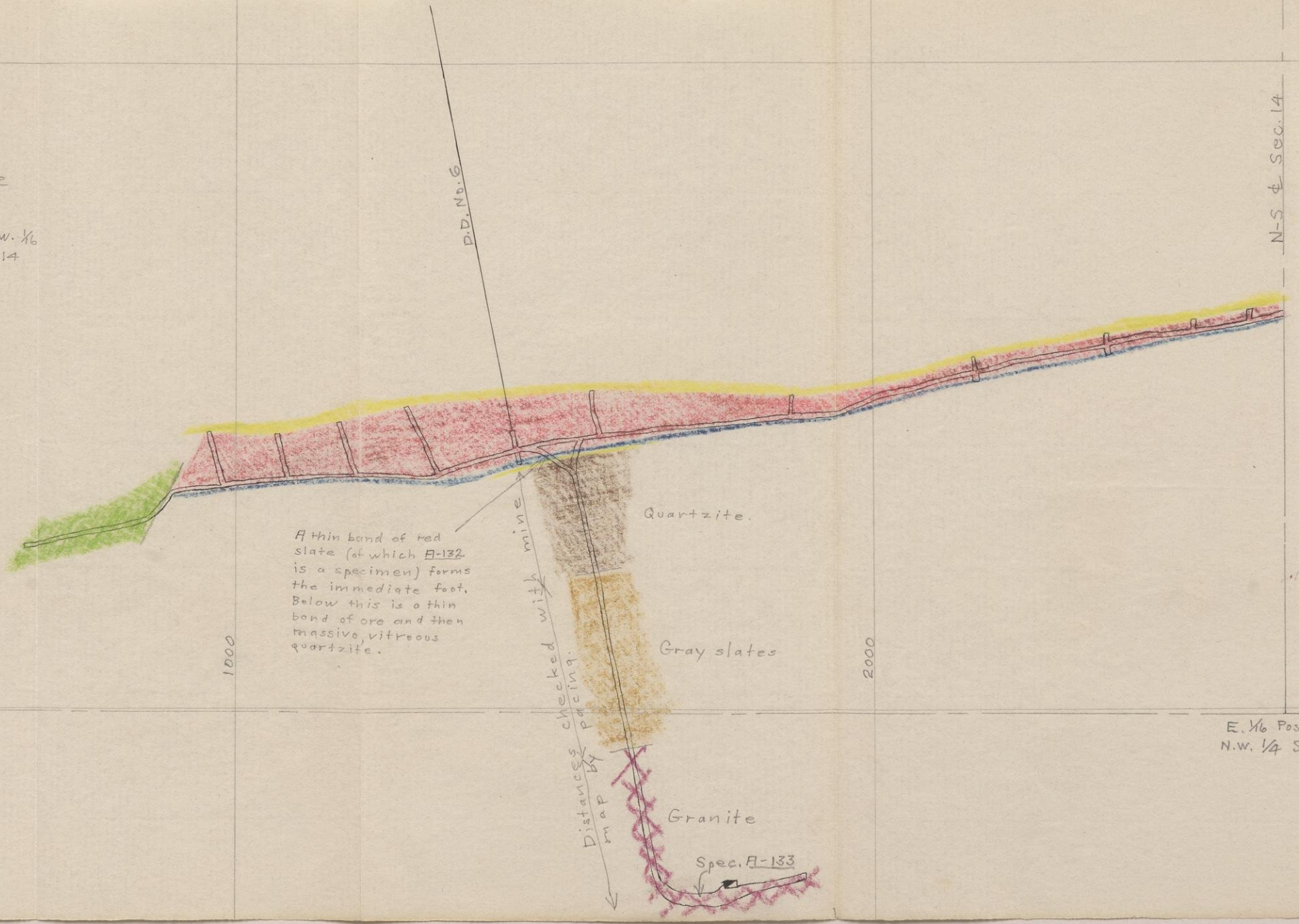
CROSS SECTION
thru New Shaft
Palms Mine
Scale 1"=200'

1000

Plan of 11th Level Palms Mine

Scale 1"=200'

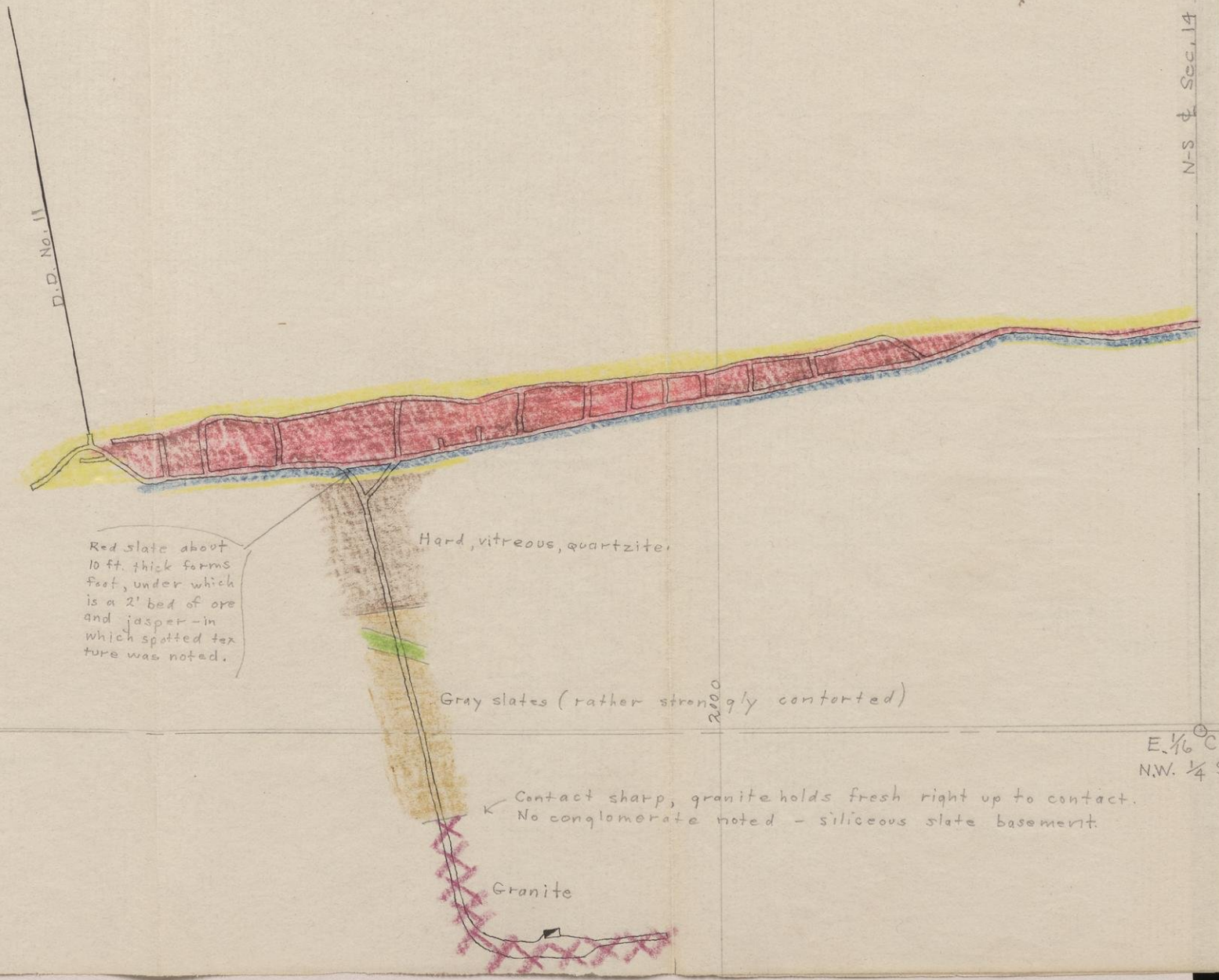
Coordinates refer to W. 1/16 post of N.W. 1/4 Sec. 14



1000

Plan
of
9th Level
Palms Mine
Scale 1" = 200'

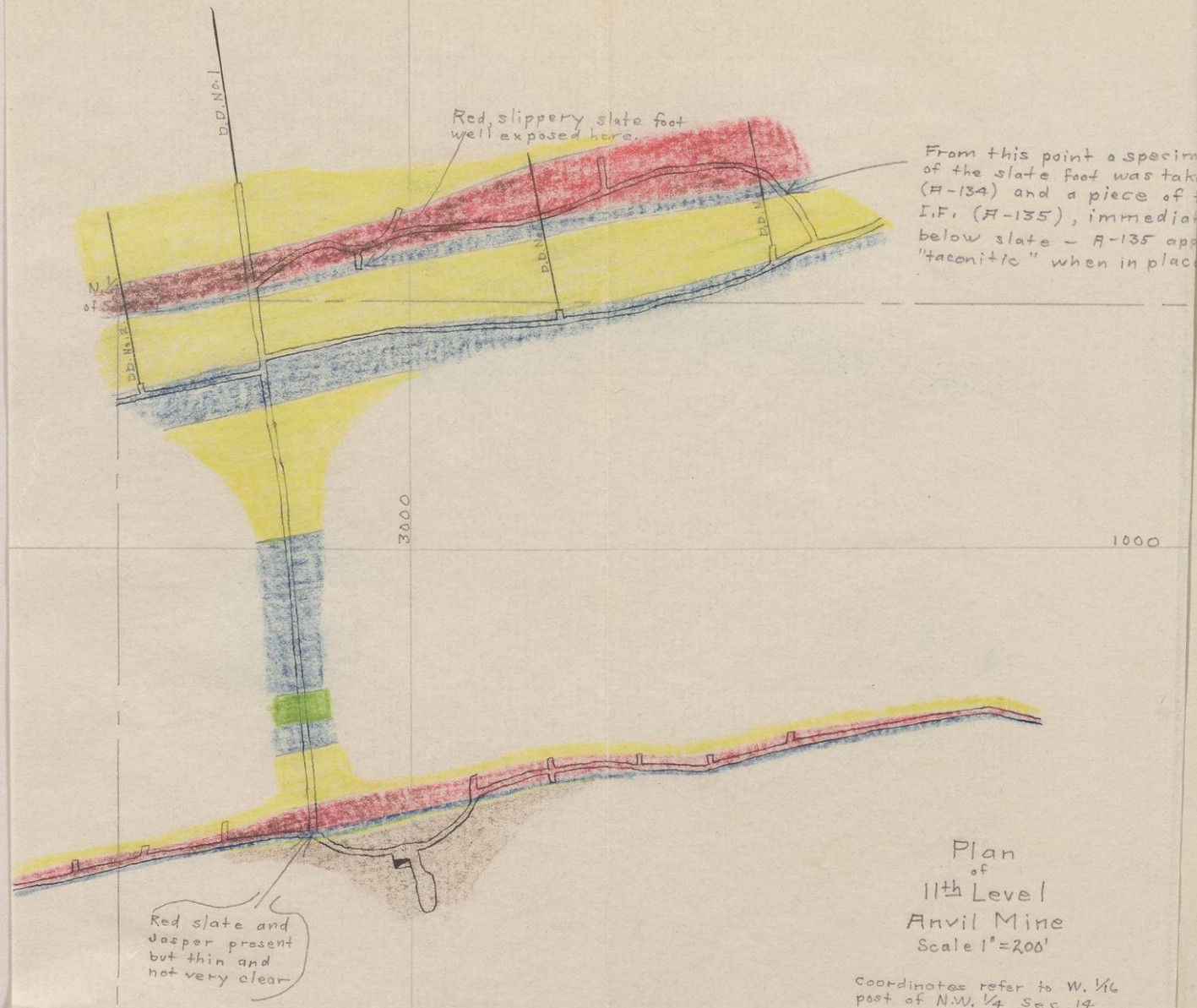
Coordinates refer to W. 1/16 post of N.W. 1/4 Sec. 14.



1000

0

2000



Plan
of
11th Level
Anvil Mine
Scale 1" = 200'

Coordinates refer to W. 1/16 post of N.W. 1/4 Sec. 14

Plan of 9th Level Anvil Mine

Scale 1" = 200'

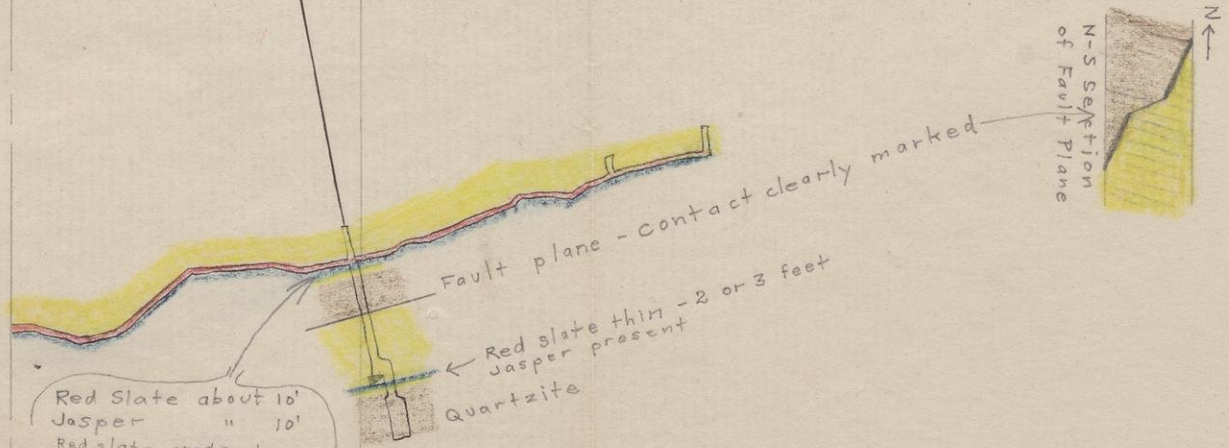
Coordinates refer to W. 1/16 post of N.W. 1/4 Sec. 14.

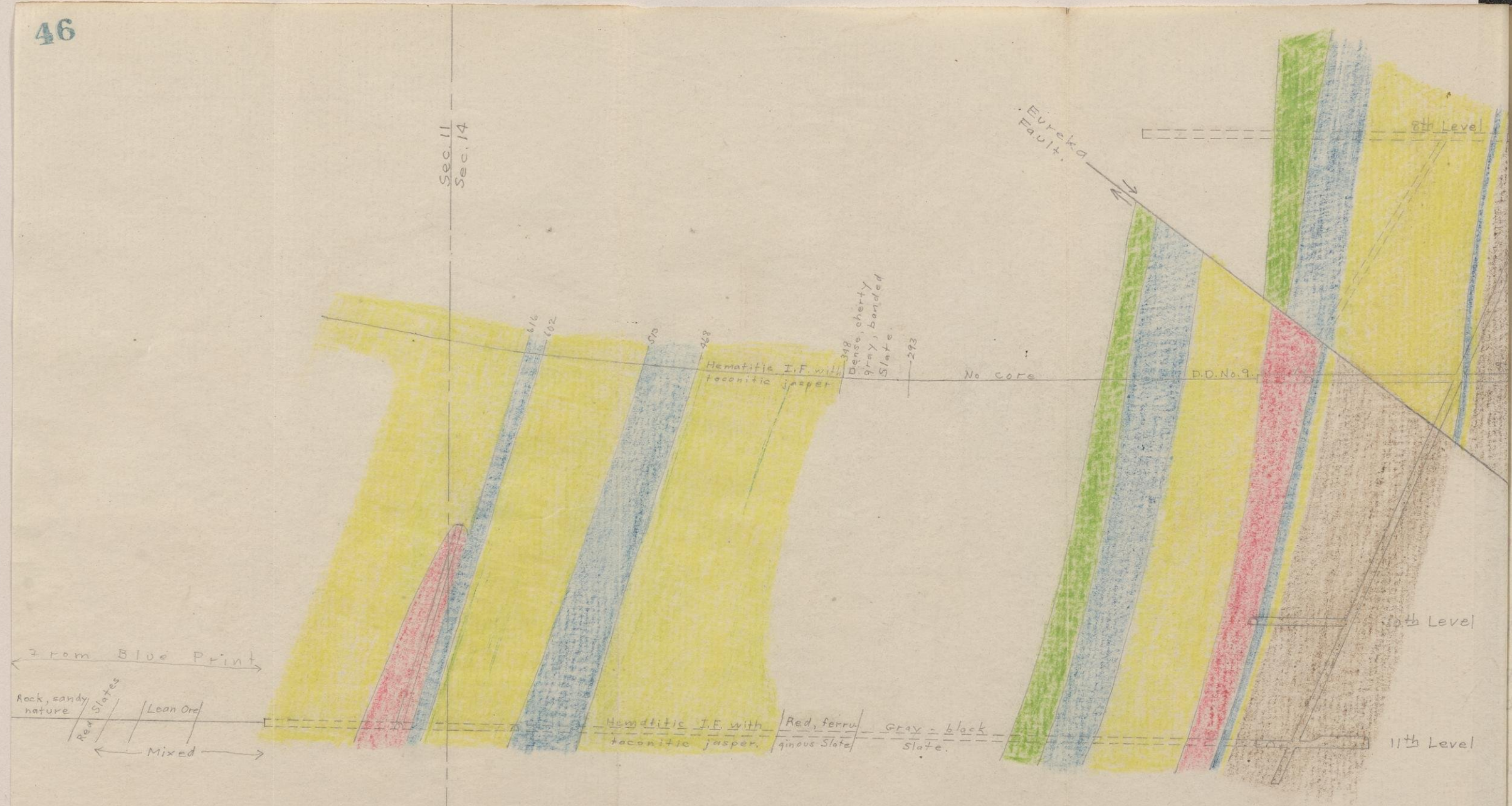
N. 1/4 Post of Sec. 14

3000

1000

D.D. No. 9

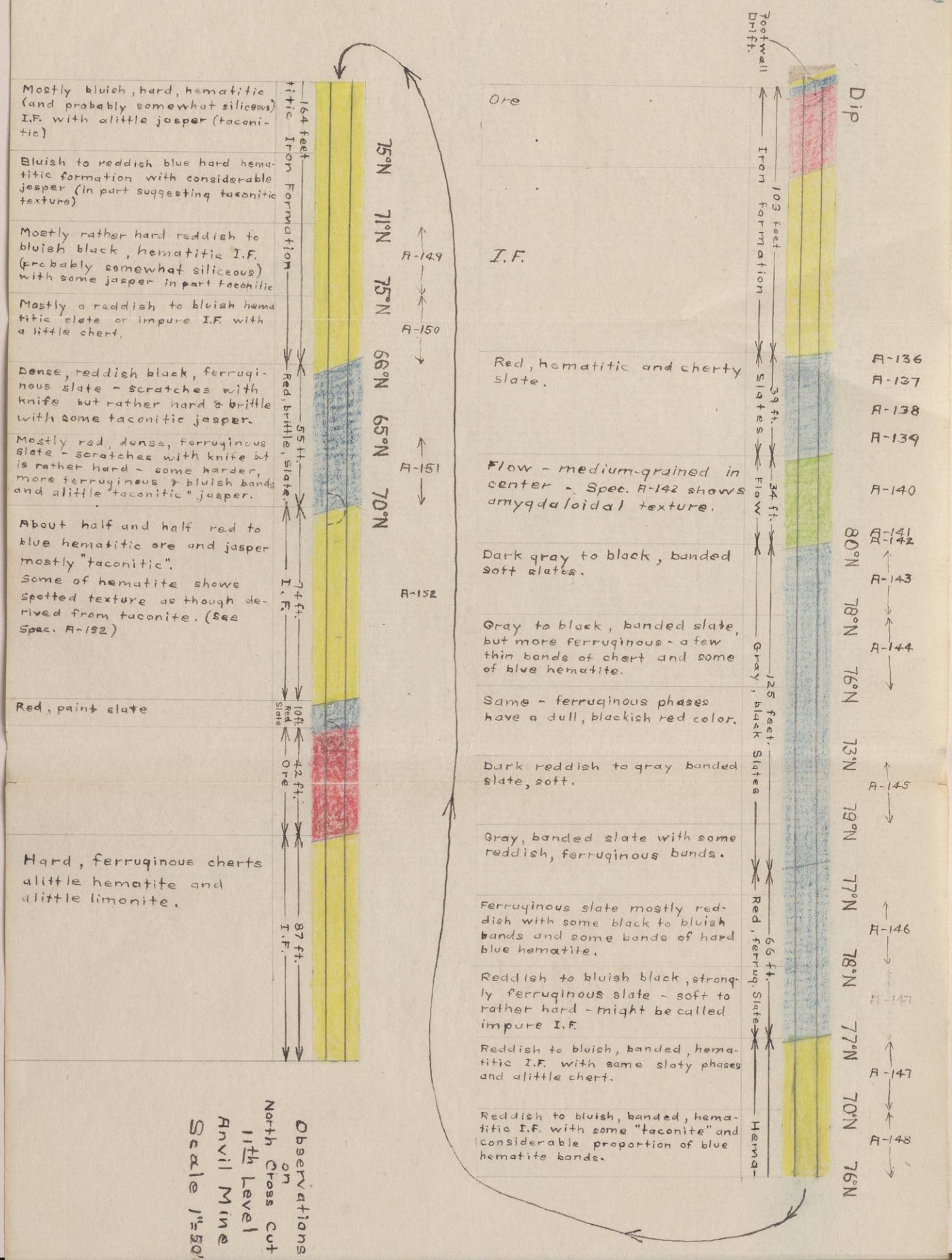




Section showing correlation of D.D. #9 and 11th Level Cross-cut.

Anvil Mine

Scale - 1" = 100'



Observations on North Cross cut 11th Level Anvil Mine
Scale 1"=50'

Sept. 9, 1915 Ironwood, Mich.

I visited the Palms-Anvil mine to determine succession. Notes have been made on the accompanying maps (to left.) The immediate footwall is a red, ferruginous slate averaging about 10 feet thick. Between this and the hard vitreous quartzite is found either a band of ore or jasper or both varying from 2' to 10 feet thick. Taconitic texture was noted in several places; but where the bed has gone over to ore it is hard to see any remnant of the spotted texture.

7379 ~~A-132~~ Spec. A-132 is from the red slate foot - for location see
7380 ~~A-133~~ Plan of 11th level - Palms Mine
A-133 is from the granite 11th level - Palms Mine.

tions 7381 cut ~~A-134~~ A-134 is from the slate which forms the foot of the
el 7382 ine ~~A-135~~ hanging ore body at the Anvil and A-135 is from the
1"=50' I.F. immediately below this slate - for exact location

7383 to ~~A-136~~ see plan of 11th level - Anvil.
~~to~~ A-136 to A-152 incl. are
~~A-152~~ from the north cross-cut, 11th
7399 level - Anvil, their location being shown on the Observation Sheet of said cross-cut.

The fault found on the 9th level Anvil is probably the Eureka fault and should cut D.D.#10 (from the east end of the 8th level) On the 9th level-Anvil- the fault throws the lower block 130 ft. north. To the westward, in the Palms there is a suggestion (from the relation of the slate-granite contact in the New Shaft and in the cross-cut on the 9th) of a fault of similar throw and very likely this is the continuation of the Eureka fault though this would mean that it swings rather strongly to the south.

Sept. 11, 1915 Ironwood, Mich.

Examined drill holes Nos. 9 and 10 at the Anvil and took the following specimens.

77400 A-153	from D.D. #9	- 299	feet.
77401 A-154	" "	- 396	"
77402 A-155	" "	- 426	"
77403 A-156	" "	- 472	"
77404 A-157	" "	- 487	"
77405 A-158	" "	- 775	"
77406 A-159	" D.D. #10	- 626	"
77407 A-160	" "	- 712	"

Sept. 14, 1915 Cary Office Hurley Wisc.

Royce gave me the following surveyed locations all referred to the N.W. Cor. of Sec. 18 - 47 - 45.

Elevation above sea level in red ink

Station	Latitude	Departure	Elevation
6	-2629.	+2167.	1548.2 - 9.4
1	- 493.	0.	+ 0.1
5	- 607.	+ 212.	1552.5 + 4.4
6	- 680.	- 113.	1547.0.5 + 7.6
7	- 832.	- 397.	1522.9 -24.2
8 *	- 902.	- 513.	1518.0 - 30.1
9	- 712.	+ 560.	1553.0 + 4.9
10	- 845.	+1020.	1571.9 + 22.9
11	- 791.	+1517.	1579.7 + 31.6
12 †	- 970.	+1562.	1570.7 + 22.6
#1 Shaft			1617.7 + 69.6

* Collar Asteroid Shaft.
† Collar #2 Milzado Shaft.

Drill Hole	Elevation	Drill Hole	Elevation
C-1	1538.5 -9.6	A-1	1550.5 +2.4
C-2	1542.1 - 6.0	A-2	1554.8 + 6.7
C-3	1522.9 -15.3	A-3	1534.2 -13.9
C-4	1523.8 -19.3	A-4	1536.8 -11.3
C-5	1525.5 -15.6	A-5	1537.6 -10.5
C-6	1523.5 -19.6	A-6	1526.8 -11.3
C-7	1538.6 -9.5	A-7	1530.9 -17.2
C-8	1535.6 -12.5	A-8	1555.3 + 5.4
C-9	1535.9 -12.2	A-9	1531.8 -16.3
C-10	1535.1 -13.0		
C-11	1532.4 -15.7		

Drill Hole	Elevation	Drill Hole	Elevation
B-1	154 1.1 − 7.0	B-5	155 6.9 + 8.8
B-2	155 4.9 + 5.9	B-6	154 6.1 − 2.0
B-3	155 3.7 + 5.6	B-7	155 1.3 + 3.2
B-4	154 9.4 − 7.9	B-8	154 6.5 − 1.6

Sept. 20, 1915 Ironwood

The following specimens are from the old Mikado drilling.

77408 H-161	Hole No. 1	-	207'
77409 H-162	" "	-	269'
77410 H-163	" "	-	292'
77411 H-164	" "	-	382'
77412 H-165	" "	-	442'
77413 H-166	" "	-	465'
77414 H-167	" "	-	494'
77415 H-168	" "	-	532'
77416 H-169	" "	-	561½'
77417 H-170	" "	-	562½'
77418 H-171	Hole No. 2	-	27'
77419 H-172	" "	-	106'
77420 H-173	" "	-	142'
77421 H-174	" "	-	196'
77422 H-175	" "	-	264'
77423 H-176	" "	-	391'
77424 H-177	" "	-	473'
77425 H-178	" "	-	513'
77426 H-179	" "	-	563'
77427 H-180	" "	-	617'
77428 H-181	" "	-	667'
77429 H-182	" "	-	716'
77430 H-183	" "	-	802'
77431 H-184	" "	-	808'
77432 H-185	" "	-	903'
77433 H-186	" "	-	917'
77434 H-187	" "	-	968'
77435 H-188	Hole No. 3	-	112½'
77436 H-189	" "	-	141'

77437 A-190 - Hole No. 3 - 199'
77438 A-191 - " " - 239'
77439 A-192 - Hole No. 4 - 118'
77440 A-193 - " " - 212'
77441 A-194 - " " - 247'
77442 A-195 - " " - 264'
77443 A-196 - " " - 378'
77444 A-197 - " " - 431'
77445 A-198 - " " - 449'
77446 A-199 - " " - 520'
77447 A-200 - " " - 557'
77448 A-201 - " " - 618'
77449 A-202 - " " - 620'-630'
77450 A-203 - " " - 643'
77451 A-204 - " " - 674'
77452 A-205 - " " - 724'
77453 A-206 - " " - 804'
77454 A-207 - Hole No. 5 - 411'
77455 A-208 - " " - 436'
77456 A-209 - " " - 571'
77457 A-210 - " " - 640'
77458 A-211 - " " - 700'
77459 A-212 - " " - 748½'
77460 A-213 - " " - 750'
77461 A-214 - " " - 1011'
77462 A-215 - " " - 1030'
77463 A-216 - " " - 1044'
77464 A-217 - " " - 1080'
77465 A-218 - " " - 1093'
77466 A-219 - " " - 1105'
77467 A-220 - " " - 1124'
77468 A-221 - " " - 1136'
77469 A-222 - " " - 1169'
77470 A-223 - Hole No. 6 - 63'-113'
77471 A-224 - " " - 287'-298'

77472
H-225 - Hole No. 6 - 306'-311'
77473
H-226 - " " - 346'-349'
77474
H-227 - " " - 479'-485'
77475
H-228 - " " - 528'
77476
H-229 - Hole No. 7 - 81'-84'
77477
H-230 - " " - 170'
77478
H-231 - " " - 243'-247'
77479
H-232 - " " - 276'-279'
77480
H-233 - " " - 281'-285'
77481
H-234 - " " - 328'-332'
77482
H-235 - " " - 332'-334'
77483
H-236 - " " - 415'-418'
77484
H-237 - " " - 428'-437'
77485
H-238 - " " - 449'-459'
77486
H-239 - " " - 535'-538'
77487
H-240 - " " - 538'-560'
77488
H-241 - " " - 560'-586'
77489
H-242 - " " - 646'-661'
77490
H-243 - " " - 661'-667'
77491
H-244 - Hole No. 8 - 225'
77492
H-245 - " " - 236'
77493
H-246 - " " - 253'-254'
77494
H-247 - " " - 259'
77495
H-248 - " " - 280'
77496
H-249 - " " - 298'
77497
H-250 - " " - 325'
77498
H-251 - " " - 348'
77499
H-252 - " " - 452'
77500
H-253 - " " - 470'
77581
H-254 - " " - 490'
77502
H-255 - " " - 511'
77503
H-256 - " " - 520'
77504
H-257 - " " - 526'
77505
H-258 - " " - 538'
77506
H-259 - " " - 597'

77507 H-260 - Hole No. 8 - 654'
77508 H-261 - " " - 708'
77509 H-262 - " " - 732'
77510 H-263 - " " - 740'
77511 H-264 - " " - 778'
77512 H-265 - " " - 815'
77513 H-266 - " " - 829'
77514 H-267 - " " - 940'
77515 H-268 - " " - 953'
77516 H-269 - " " - 977'
77517 H-270 - " " - 1005'
77518 H-271 - " " - 1026'
77519 H-272 - " " - 1042'±-1092'±
77520 H-273 - " " - 1123'
77521 H-274 - " " - 1140'
77522 H-275 - " " - 1147'
77523 H-276 - " " - 1168'
77524 H-277 - Hole No. 8? - 849'
77525 H-278 - " " - 924'
77526 H-279 - Hole No. 9 - 152'
77527 H-280 - " " - 185'
77528 H-281 - " " - 256'
77529 H-282 - " " - 276'
77530 H-283 - " " - 334'
77531 H-284 - " " - 359'
77532 H-285 - " " - 419'
77533 H-286 - " " - 453'
77534 H-287 - " " - 513'
77535 H-288 - " " - 544'
77536 H-289 - Hole No. 10 - 122'-131'
77537 H-290 - " " - 214'-217
77538 H-291 - " " - 236'
77539 H-292 - " " - 270'
77540 H-293 - " " - 383'-388'
77541 H-294 - " " - 416'-419'

77542
H 295 - Hole No. 10 - specimen representative of iron formation - 431'-669' (see card)

77543
H 296 Hole No. 10 - specimen representative of dike - 431'-669' (see card)

77544
H 297 - Hole No. 11 - 140'
77545
H 298 - " " - 410'
77546
H 299 - " " - 430'
77547
H 300 - " " - 436'
77548
H 301 - " " - 452'
77549
H 302 - " " - 480'
77550
H 303 - " " - 688'
77551
H 304 - " " - 720'
77552
H 305 - Hole No. 12 - 79'
77553
H 306 - " " - 105'
77554
H 307 - " " - 137'
77555
H 308 - " " - 139'
77556
H 309 - " " - 149'
77557
H 310 - " " - 178'
77558
H 311 - " " - 187'
77559
H 312 - " " - 192'
77560
H 313 - Hole No. 14 - 294'
77561
H 314 - " " - 770'-790'
77562
H 315 - Hole No. 15 - 155'
77563
H 316 - " " - 280'
77564
H 317 - " " - 313'
77565
H 318 - " " - 354'
77566
H 319 - " " - 527'
77567
H 320 - " " - 593'
77568
H 321 Hole No. 16 - 92'
77569
H 322 - " " - 160'
77570
H 323 - " " - 175'
77571
H 324 - " " - 208'

77572
A-325 - Hole No. 16 - 304'
77573
A-326 - " " - 345'
77574
A-327 - Hole No. 17 - 100'
77575
A-328 - " " - 140'
77576
A-329 - " " - 240'
77577
A-330 - " " - 310'
77578
A-331 - Hole No. 19 - 15'
77579
A-332 - " " - 45'
77580
A-333 - " " - 120'
77581
A-334 - Hole No. 20 - 25'
77582
A-335 - " " - 85'
77583
A-336 - Hole No. 21 - 25'
77584
A-337 " " - 72'
77585
A-338 " " - 140'
77586
A-339 " " - 175'
77587
A-340 " " - 185'-190'
77588
A-341 " " - 193'

Oct. 2, 1915 Ironwood, Mich.

The following elevations on the C & N.W. R.R. were given me by Mr. Packard.

Point.	Elevation above lake	Elevation above sea level
North rail at Ramsay depot - - - -	850.0	1452.0
Culvert No. 1108 over Black River - just west of spur to Asteroth - S.W. corner S. end E. head wall - - - -	899.23	1501.23
Bridge - 1106 east of Verona - lower rail - - - -	941.5	1543.5
Top of S.W. coping stone of water tank at Wakefield just west of station (about 1.3 above rail)	945.77	1547.77

Oct. 3, 1915 Ironwood, Mich.

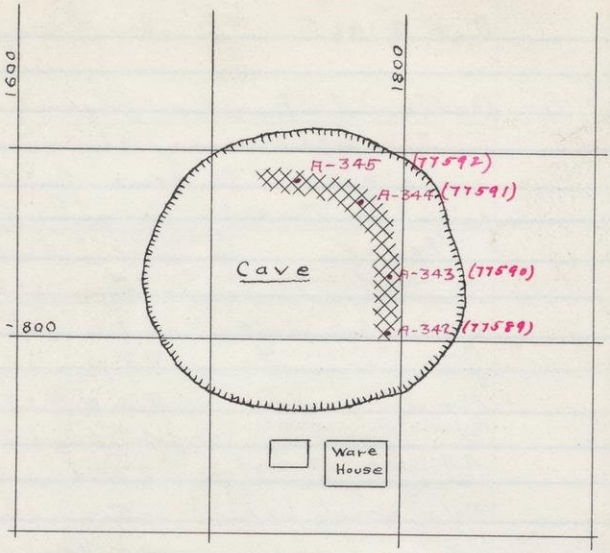
Asteroid - Eureka Elevations

The following elevations were given to me by Felman, engr. for Castile Mining Co.

Point. (see map of surface)	Elevation referred to No. 3. Eureka Shaft.	Elevation above sea level
Collar Ast. Shaft.	- 21.0	1518.0
Rim at Asteroid pump house	- 73.0	1466.0
#2 Mikado	+ 33.0	*1572.0
River at north Ramsay bridge	- 145.0	1394.0
R.R. tracks at Road crossing Ramsay	- 87.7	1451.3
New county road	- 102.0	1437.0
Point east of Finnish Hall	- 100.8	1438.2
Point east of Ramsay station	- 76.0	1463.0
Point south of Ramsay station	- 70.0	1469.0
No. 3. Eureka Shaft	0.0	1539.0
No. 2. " "	+ 61.3	1600.3

* The difference between this value and Royce's (1570.7) is due to different points on shaft collars being used - I have taken Royce's values.

Collar Amil Shaft.	143.0	1682.0



Sketch
of
Cave on Mikado
Showing
location of specimens
Scale 1" = 100'

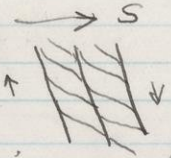
77 5
77 5
77 5
77 5
77 5

Oct. 3, 1915 Ironwood, Mi.

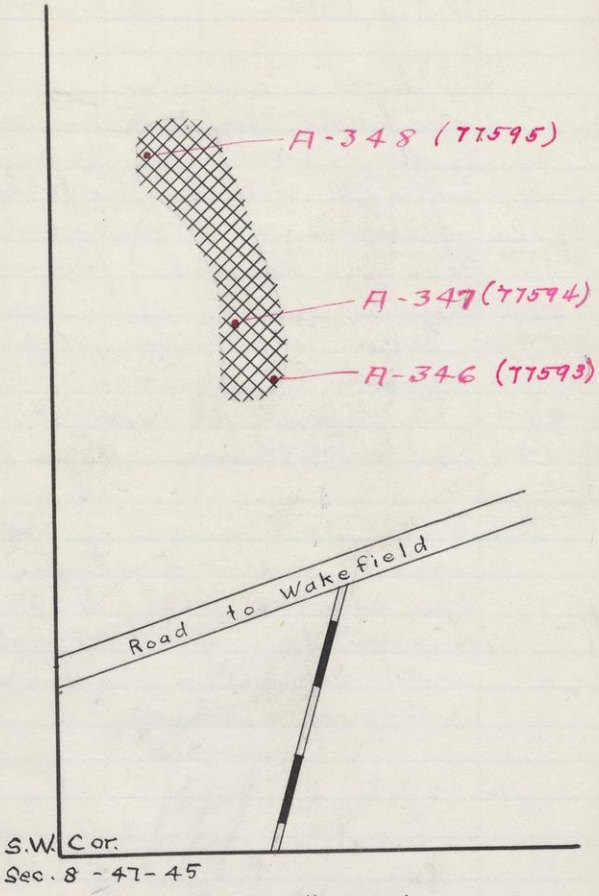
In the cave near No. 2. Mikado Shaft is an outcrop of dike material from which I took the following specimens - (for exact location see sketch - forward)

77589 ~~A-342~~ from southern edge
77590 ~~A-343~~ about 30' farther north
77591 ~~A-344~~ still farther north.
77592 ~~A-345~~ at northern edge.

At A-343 a set of fractures exists inclined steeply to the south. At A-343 is a similar set of fractures with smaller fractures crossing - thus



suggesting a shear along the main fractures throwing the S side down.



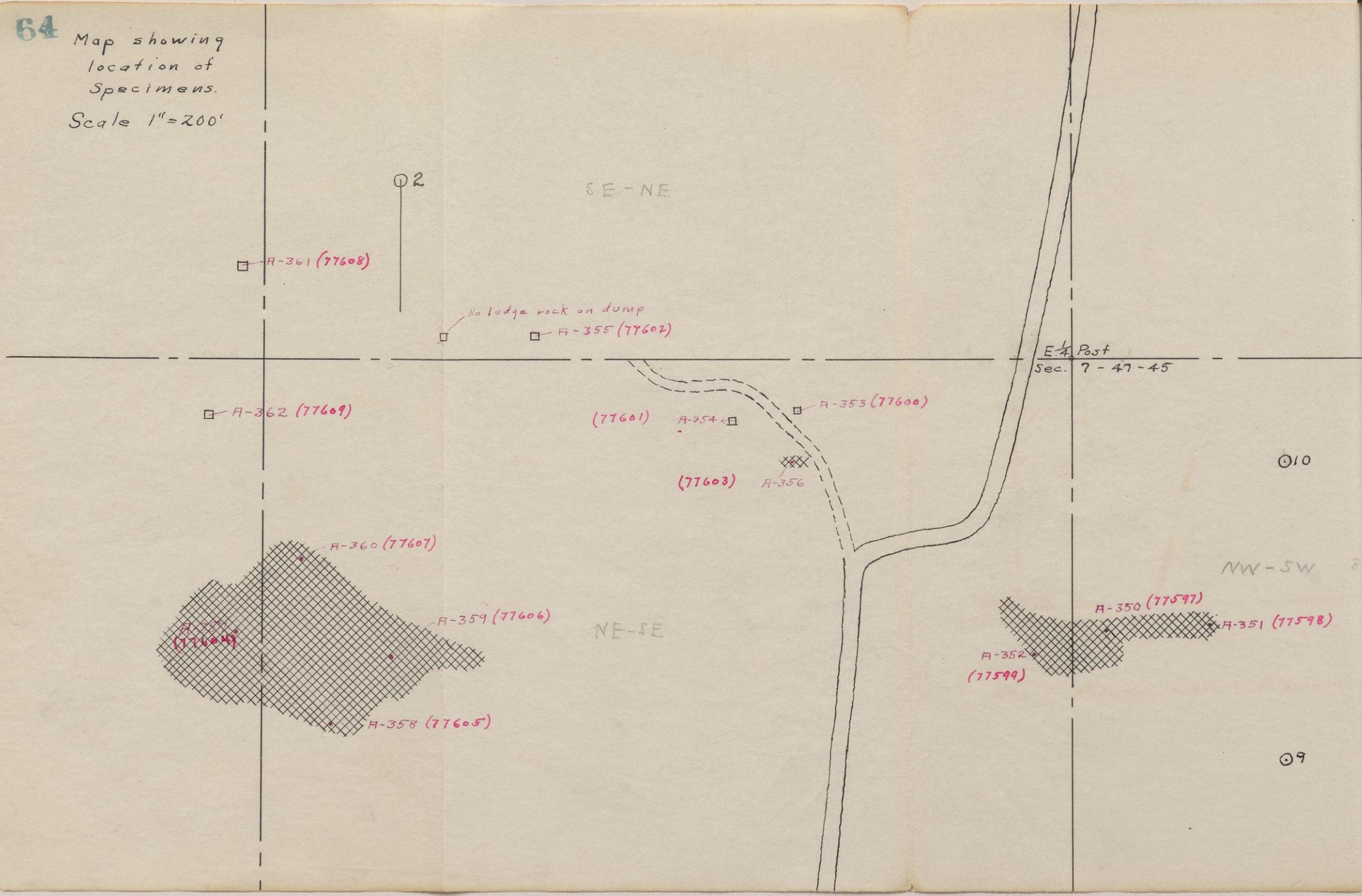
Scale 1" = 200'

Sketch showing location of specimens.

64

Map showing location of Specimens.

Scale 1"=200'



Oct. 3, 1915. Ironwood, Mich.

77593
A-346
77594
A-347
77595
A-348
} From outcrop of diorite in S.W. corner sec. 8 - 47 - 45. See sketch on opposite page.

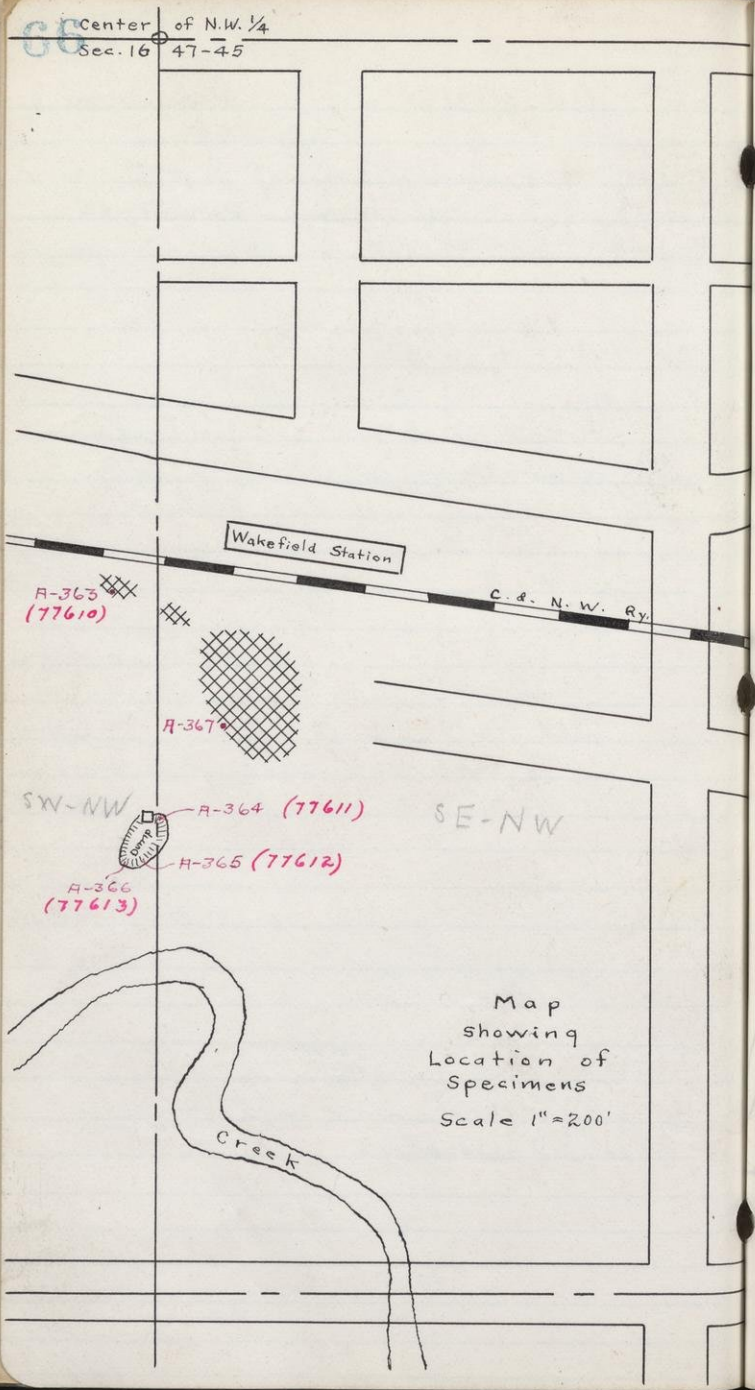
Oct. 4, 1915

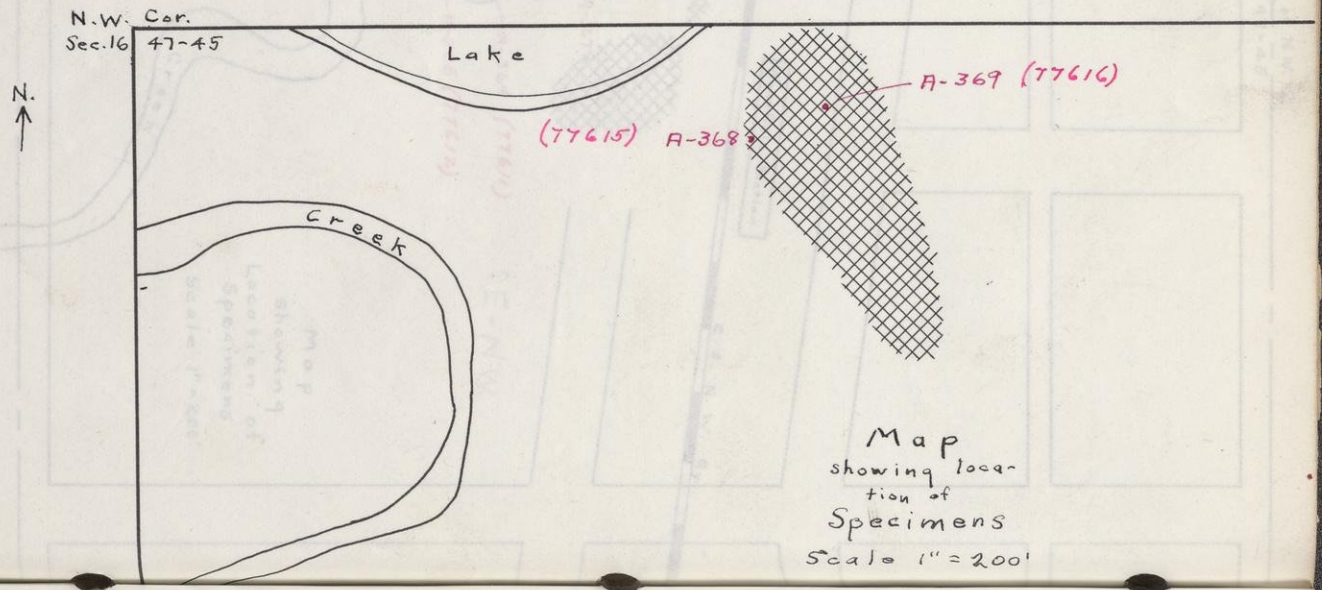
Royce gave me the following elevations referred to the level of Sunday Lake.

No. 1 Shaft -	Brotherton	+ 27.5
No. 2 " -	"	+ 23.0
Clarke "	"	+ 18.5
No. 3 " -	"	+ 49.0
No. 4 " -	Sunday Lake	+ 70.0
Old Shaft S.E. of	No. 4	+ 68.0
No. 5 Shaft -	Sunday Lake	+ 68.0
No. 6 " -	" "	+ 50.5

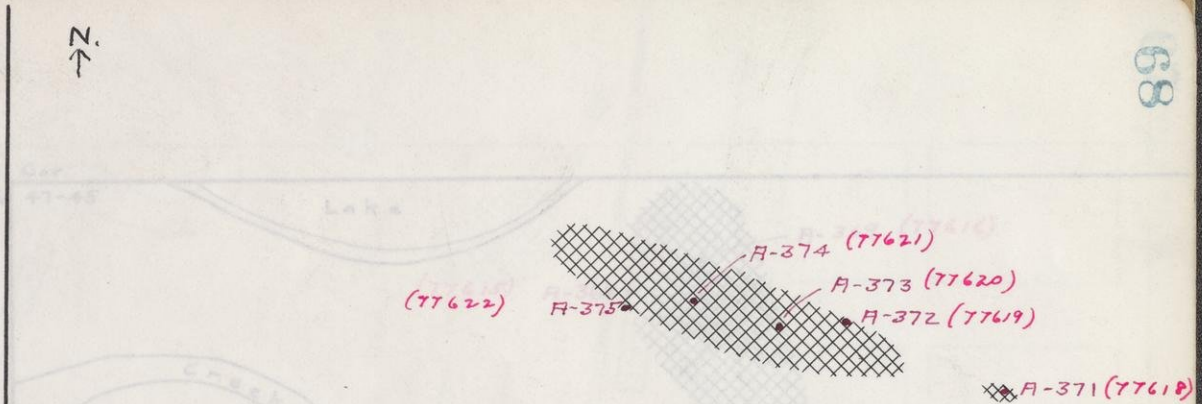
77596
A-349 is from pit 1100 ft. N. & 450 ft W. of S.E. Cor. Sec. 7. 47-45 Mich.

77597
~~A-350~~
~~to to~~
~~A-362~~
77609
} For location of these specimens see map opposite.


Center of N.W. 1/4
Sec. 16 47-45
Wakefield Station
C. & N. W. Ry.
A-363
(77610)
A-367
SW-NW
A-364 (77611)
SE-NW
Dump
A-365 (77612)
A-366
(77613)
Creek
Map
showing
Location of
Specimens
Scale 1" = 200'



Map
showing location of
Specimens
Scale 1" = 200'



Map
Showing location of specimens
Scale 1" = 200'

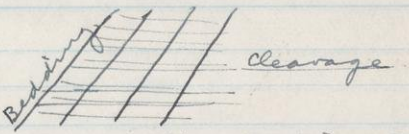
S. 1/4 Post
Sec. 7 - 47-45

Oct. 4, 1915 Ironwood, Mich

77610
A-363 } For location of these
to } specimens see map
A-367 } opposite.
77614
77615
A-368 } See map opposite.
77616
A-369 }

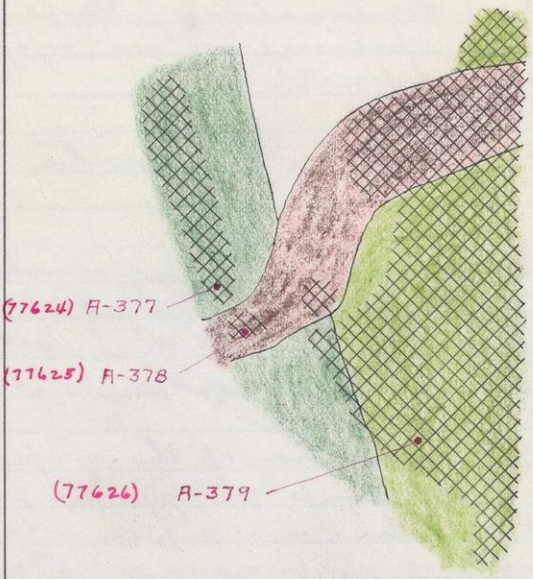
77617
A-370 From outcrop of greenstone
410' N. & 310' E. of S.W. cor.
Sec. 10 47 N.-45 W. (just
south of quartzite hill)

77618
A-371 } For location of these specimens
to } see map on opposite page.
A-375 } In the outcrop from which
77622 these specimens were taken
the relation of cleavage to
bedding is about as follows



Vertical Section looking East.

77623
A-376 is from outcrop 980' N. & 720'
W. of S. 1/4 post Sec. 7 - 47-45



Map
showing location of specimens
Scale - 1" = 200'

Ellipsoidal greenstone
Banded schist
Granitic rock

S. 1/4 Post
Sec. 16 - 47-4

Oct. 5, 1915 Ironwood, Mi.

Aneroid Elevations.

Place	Elevation by aneroid	Corrected Elevation
R.R. at Ramsay crossing	873	1451.
Where road turns to creek - Ramsay	857	1438.
Bridge 11' above water	839	1423.
Where road turns due east	882	1470.
W. ¼ post sec. 18	957	1548.
N. ¼ " S.W. ¼ 18	958	1552.
Water's edge at bridge near center of 18	931	1529
W. ¼ post S.W. ¼ 17	1030	1641
Center " " "	1055	1641
"B.M. 64" - 5' above creek	967	1544
Where road turns to Wakefield	967	1544
750' W. of center 16	980	1550
Water tanks - Wakefield	985	1547

77624
~~A-377~~
~~to~~ to
A-379
77626

} For location of these specimens see map opposite.

72

DETAILS OF GEOLOGIC STRUCTURE OF IRONWOOD IRON FORMATION AT WAKEFIELD MINE.

Determined from a study of the ore body between Section 400 East of N-S$\frac{1}{4}$ line and West section line of Sec. 17-47-45.

Member and Description — Thickness where undeformed

Footwall quartzite (Palms Formation)

Ironwood Formation:-

RedSlate ---------- 10'-35'

Lower Yellow Ore (Massive yellow and black ore, usually manganiferous, with bedding indistinct and usually lacking)---------- 40'-60'

Middle Member (Dark purplish ore with very distinct and uniform bedding, at the bottom, which gives way gradually to thin-bedded yellow ore at the top)---------- 80'-120'

Upper Slatey Member (Red ore of distinctly slatey character, frequently carrying iron up to 60%, but more often rather lean, especially at the upper part where it resembles the footwall slate.)---------- 40'-50'

Hanging Wall Diabase (Probably an inter-bedded flow)

Oct. 6, 1915 Ironwood, Mich.

I visited the Wakefield Pit with Wolf. The beds at the west end are quite steep whereas at the east end the dip flattens to almost 25° thus producing an anti-clinal warp which pitches about 30° eastward. Wolf has worked out the succession on opposite page.

I gave particular attention to the slate-sill contact which is exposed for considerable distances. The sill diabase is very strongly weathered. At one or two points the diabase seemed to cut the slate beds; but on account of the weathered condition, the evident dump, and possible faulting, no great significance can be attached to these occurences as showing the diabase to be intrusive in character.

77627
~~A-380~~
77628
~~A-381~~
77629
~~A-382~~
77630
~~A-383~~

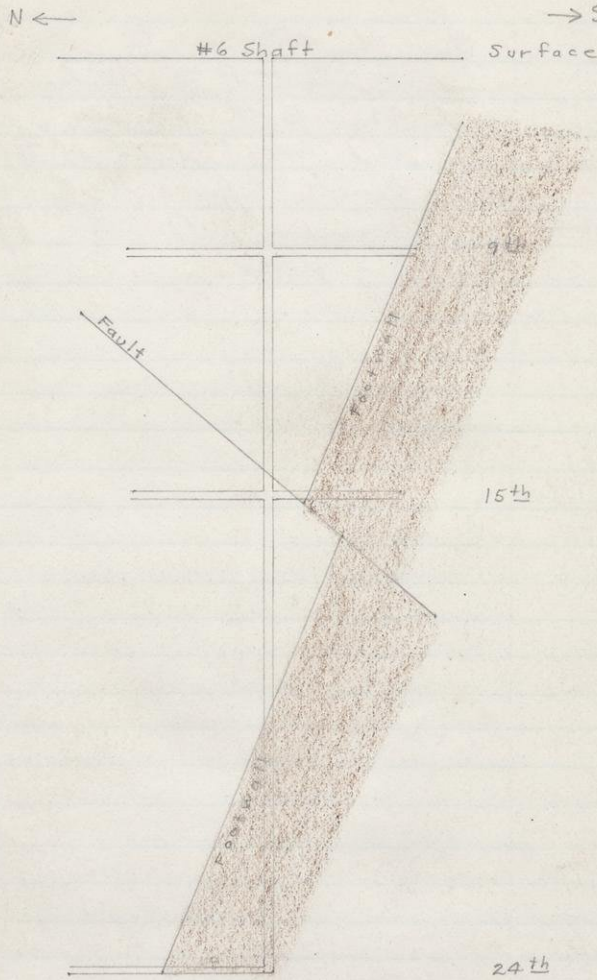
Spec. A-380 and A-381 are from the lower edge of the sill, A-382, the diabase a short distance from the lower edge. A-383 is a piece of the Lower Yellow Ore referred to in Wolf's classification.

Oct. 6, 1915 Ironwood, Mich.

On the 4th & 5th Dr. Leith and I visited the Palms-Amal and Newport Mines.

77631 A-384 At the west end of the 11th level Palms I took a specimen - A-384 - of the big dike.

TILDEN MINE



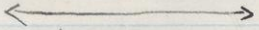
Sketch showing approximate position of footwall at No. 6 shaft.

Oct. 7, 1915 Ironwood, Mich.

Tilden Mine:- On the 24th level a cross-cut north into the hanging shows the following rocks:-

77632	Slaty quartzite	95 ft.
A-385	Vitreous quartzite	145 ft.
	(Spec. A-385 from upper contact)	
77633		
A-386	Red slate	13 ft.
77634		
A-387	Iron formation	132 ft.
	(mostly cherty carbonate like A-387)	
77635	Cherty slate	105 ft.
A-388	Sill	8 ft.

Above the sill come cherty to soft gray slates followed by red ferruginous slate grading up into banded taconite & blue hematite

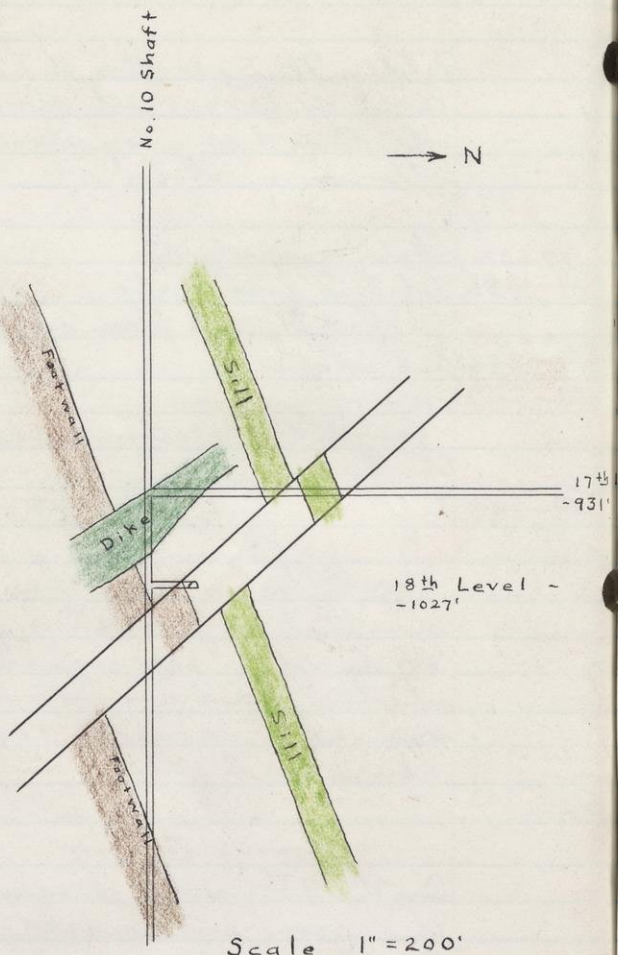


On the 9th level I examined the cross-cut north from #6 Shaft. The cross-cut goes 640 ft. north of the shaft and the sill lies about 20 ft. south of the shaft making 660 ft. from the sill to the end of the cross-cut. By pacing I made the following classification of material - reduced

77

TILDEN MINE

vertical section



Scale 1" = 200'

Sketch showing faulting and main "Palms" dike at No. 10 Shaft

(Elevations referred to Collar No. 10 Shaft.)

No. 10 Shaft is 40' E. & 50' N. of Center of N.E. 1/4 Sec. 15 - 47-46. and is 1512' above se level.

To true thickness of formation on the basis of a uniform 70° dip to the north which corresponds roughly with the facts.

	Description of Formation	Thickness in Cross-cut	True Thickness	True Distance from Sill
	Sill			0'
	Red and gray soft to cherty slate	46'	43'	43'
	Red slates with a little jasper	67'	63'	106'
	Banded jasper and hematitic slate - slates toward bottom	96'	90'	196'
	Dike	37'	35'	231'
77636	Lean I.F. - (ore horizon?)	20'	19'	250'
~~A-389~~	Red-blue hematitic slate	67'	63'	313'
	Altered dike? Banded red brittle slate with large amount of jasper - some hematite and some taconite	103'	8' 97'	321' 418'
	Banded cherty hematitic formation	93'	87'	505'
77637 ~~A-390~~	Soft gray banded slates	65'	61'	566'
77638 ~~A-391~~	"Porphyry I.F."	22'	21'	587'
~~77639~~ ~~A-392~~	Banded "porphyry I.F."	35'	33'	620'
		660'		

The main dike runs with practically 0° pitch from 700' W. of #10 Shaft to 500' E. of same (about 500' from Palms line)

The fault pitches about 8° E. and dips about 45° S.

Oct. 8, 1915 Ironwood, Mich.

I enquired from Capt. Johnson regarding the rock in No. 2 Mikado Shaft. His recollection is as follows:-

from surface to 8th level
- 50' Surface
- 300' Dike rock
- 100' Formation
- 150' Dike

from 8th to 10th level
- jasper

below 10th level
- quartzite.

77640
A-393 These specimens are taken from the last 150' of hanging cross-cut on 1650' level of the Eureka.

Oct. 9, 1915 Lohspening, Mich.

I examined the Cleveland Cliffs drilling on Sec. 8. & 17 47-45 and took the following specimens

77641 A-394	from Hole No. 1	Sec. 17	142'-150'
77642 A-395	" " " 1	" 17	195'-206'
77643 A-396	" " " 2	" 17	72'-83'
77644 A-397	" " " 2	" 17	176'-183'
77645 A-398	" " " 6	" 17	101'-104'
77646 A-399	" " " 5	" 8	85'-93'

77647
A-400 from Hole No. 6 Sec. 8 - 93'-125'
77648
A-401 " " " 6 " 8 - 137'-157'