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NICKEL PLATE MINE

Notes on New Map Set

By Paul Billingsley
May 24, 1933

List of recommendations at end of report.

M A P S

Basic Composite Plan and Elevation, 1 in. - 100 ft., in envelope at end of report.

Set of 17 level maps, 1 in. - 100 ft., bound separately.

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NICKEL PLATE MINE

Notes on New Map Set

May 24, 1933

1. The ore bodies of the Nickel Plate Mine are extremely difficult to reproduce on maps. They are irregular three-dimensional masses, and no projection on a plane surface can indicate more than two of these dimensions. I have, therefore, for the base map, resorted to the system of a mechanical drawing, showing at the bottom a horizontal projection of all stopes and workings, and above this a side elevation coordinated with it in position.
2. There are two sets of complications: first, a series of overlapping stopes and, second, a series of overlapping levels. For the former, the stopes, I use color tones ranging from purple, for the stopes on the uppermost beds, through red and orange to yellow for the stopes on the lower beds. For the levels I use dull colors, blue, gray, green and brown.
3. The relationship to each other of the stopes shown in purple, red, orange and yellow is best seen on the side elevation. They lie alongside of a flattish porphyry sheet, the so-called Midway Dike;—three, the purple, red and orange, above, and one, the yellow, below. The upper three are separated from each other by sills of porphyry, while the lower is subdivided by a small sill. The ore beds above the Midway Dike are beveled off eastward and upward by the low-angled rise of the dike. The orange and red stopes actually wedge out between their bounding sills and the Midway. The beds below the Midway conversely bevel off westward and downward. All stopes are richest adjacent to the Midway, particularly in the wedge ends, and fade out to assay boundaries in other directions.

4. The whole series is divided through the mine by the Central Fault zone, which drops the north side in two steps for a total displacement of about 100 feet. This offsets each bed to the eastward about 200 feet on any given level. The recognition of this displacement necessitates a revision of former correlation of ore beds. The new and old identifications are shown on the table below:

<u>Color and Position</u>	<u>Former Name</u>	
	<u>S. of Central Fault</u>	<u>N. of Central Fault</u>
Purple--Upper	No. 1	No. 3
Red-----Intermediate	No. 2	No. 4
Orange-- "	No. 3	No. 5
Yellow--Lower	No. 4	No. 6

5. The levels are so obscured by the overlapping stopes that they can not be individually distinguished on a composite map. I have therefore prepared the set of separate level maps. These serve two purposes: first, they permit the geologic features to be shown in plan, and, second, they provide base maps on which engineering data can be represented, such as the numbering of drifts and crosscuts and the situation of new work. A separate set of prints is provided for the latter purpose.

6. The geological set comprises the following sheets:

	<u>Elevation</u>	<u>Old Name</u>
Surface	5900 - 6100	Surface
C $\frac{1}{2}$ Level	5860	Intermediate
B $\frac{1}{2}$ "	5750	No. 3 Adit
A "	5610	No. 4 Adit
1 "	5565 - 5570	{ 100 Dickson { 100 No. 4 Incline { 100 No. 5 Incline

	<u>Elevation</u>	<u>Old Name</u>
2 Level	5495 - 5535	{ 200 Dickson 200 No. 5 Incline 300 No. 5 Incline
4 & 4 1/2 "	5430 - 5460	{ 400 No. 5 Incline 450
5 & 5 1/2 "	5360 - 5400	{ 500 No. 8 Raise 550 No. 8 Raise
6 "	5308	600 Dickson
7 "	5260	700 Dickson
8 "	5200 - 5220	800 Dickson
9 "	5153	900 Dickson
10 "	5102	1000 Dickson
11 "	5054	1100 Dickson
12 "	5004	1200 Dickson
15 "	4850	1500 Dickson
17 "	4750	1700 Level

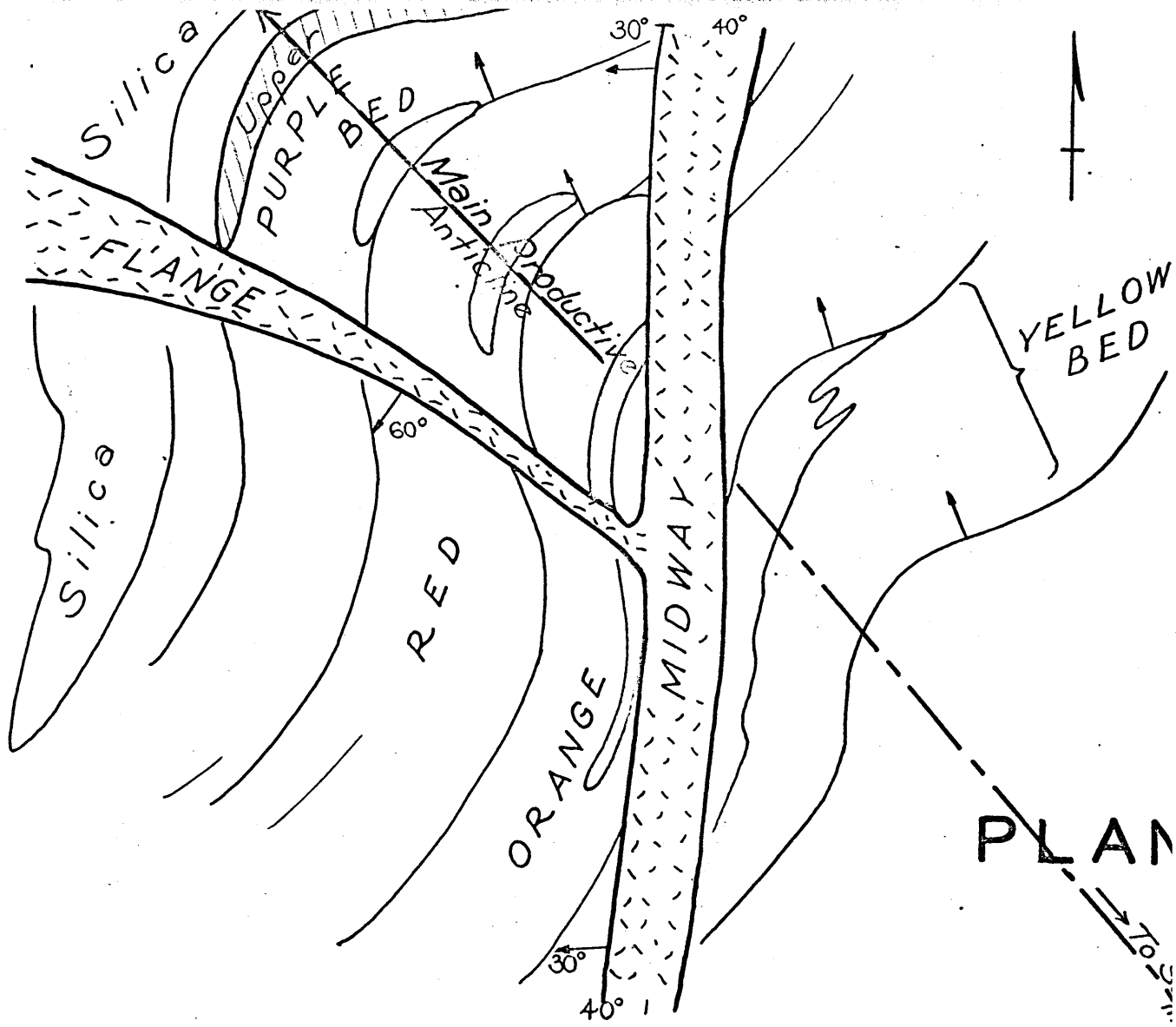
The new names are based on the main adit, as A Level, going up in the alphabet for higher levels, and down by numbers for the lower levels. Each full number below represents about 100 feet on the 30° slope of the Dickson Incline.

7. The important geological elements are as follows:

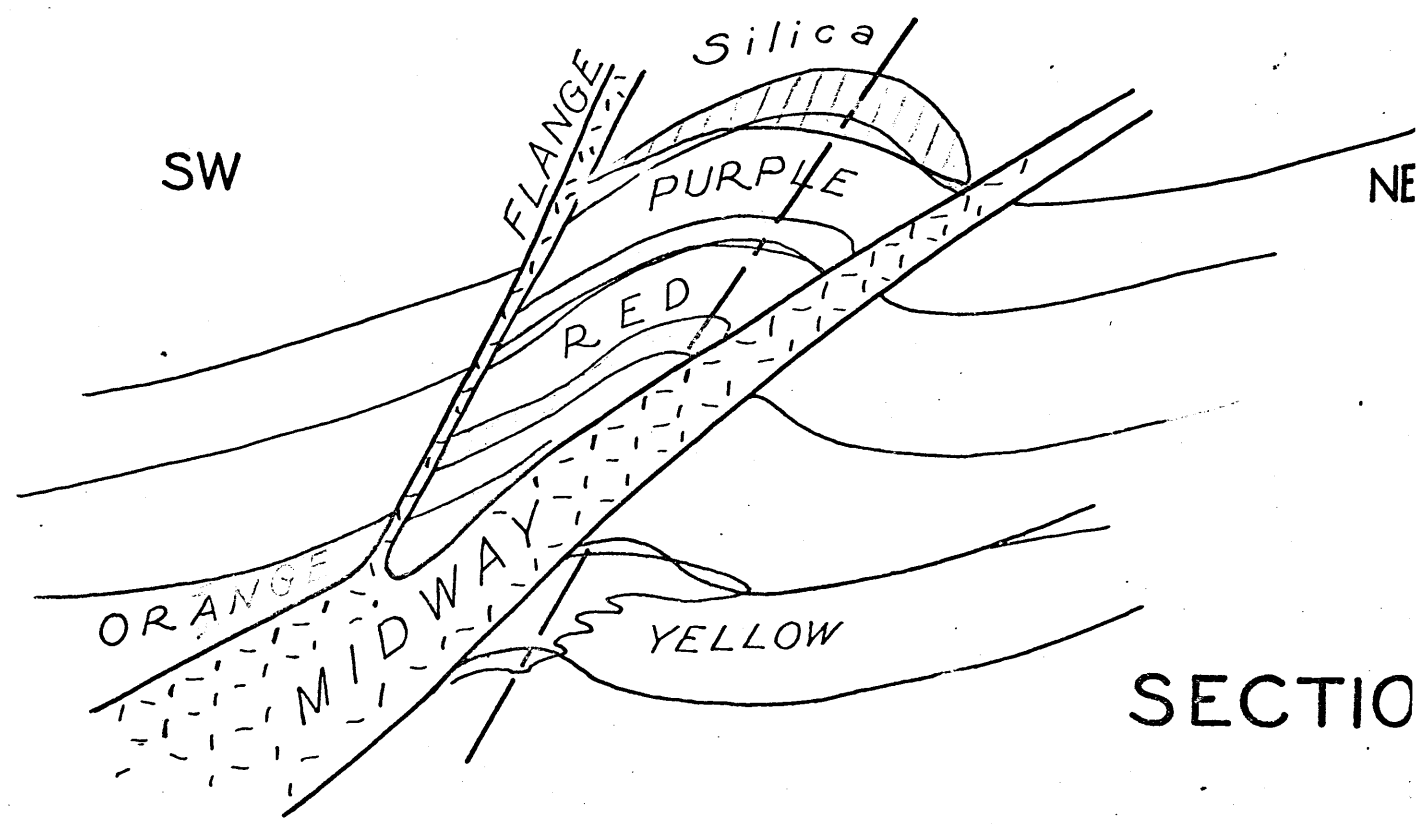
<u>Intrusive Rocks</u>	<u>Symbol</u>
Climax gabbro stock - - -	dark green
Midway " dike - - -	" "
Flange*- diorite dike- - -	" gray
Sills - andesite - - -	pattern

(*Called Nickel Plate in former reports)

<u>Mineralization</u>	<u>Symbol</u>
Breccia funnel - - - -	pattern
Silica cap - - - -	buff



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YELLOW BED

Mineralization contd.

Symbol

Upper ore bed	-	-	-	-	purple
Intermediate ore beds	-	-	-	-	red and orange
Lower ore bed	-	-	-	-	yellow

District Footwall

Symbol

Lower limit of mineralization	-	black line
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Cross Structures (faults and dikes)

Symbol

Central Fault zone	-	-	-	blue lines
South Fault zone	-	-	-	" "

8. The fundamental structures are two: the regional north-south fold and thrust zone upon which the Climax stock is located and the subordinate northwest anticline upon which the ore bodies are placed. The geologic features shown on the map set are for the most part derived from the Climax stock area but are distributed under the influence of the Main Productive Anticline.

(a) The Midway Dike follows a low angle break, apparently a flattish forward element of the Climax thrust zone. Its course is north-south, like this zone, and it dips 30 degrees westerly into it.

(b) The Flange Dike follows the southwest limb of the ore-bearing anticline. It is steeper than the Midway so joins it downward, forming with it a Y-shaped pattern tilted to the northeast (see figure facing this page).

(c) Thus, the three upper ore beds (all but the Yellow) are at the same time on the nose of the anticline and within the trough formed by the Flange and Midway dikes. The largest stopes of the mine are in this joint structure; the others, either in the Yellow bed on the nose below the Midway, or in the Orange bed along the south edge of the Flange Dike.

(d) This complex system of dikes, folds and ore bodies rakes downward

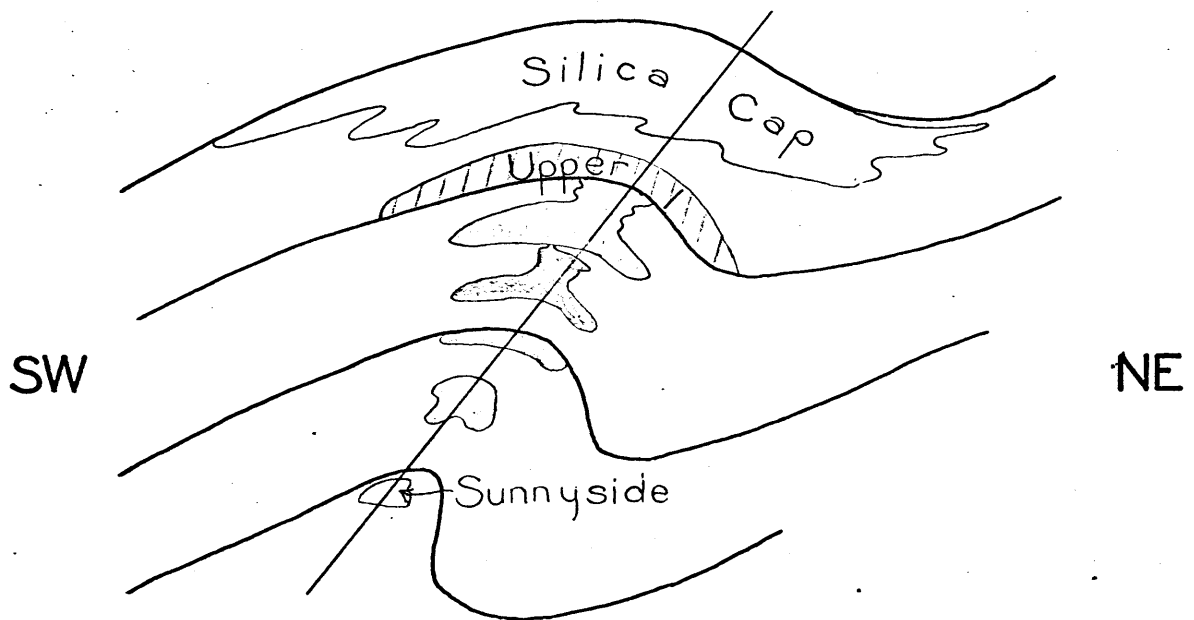
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NE

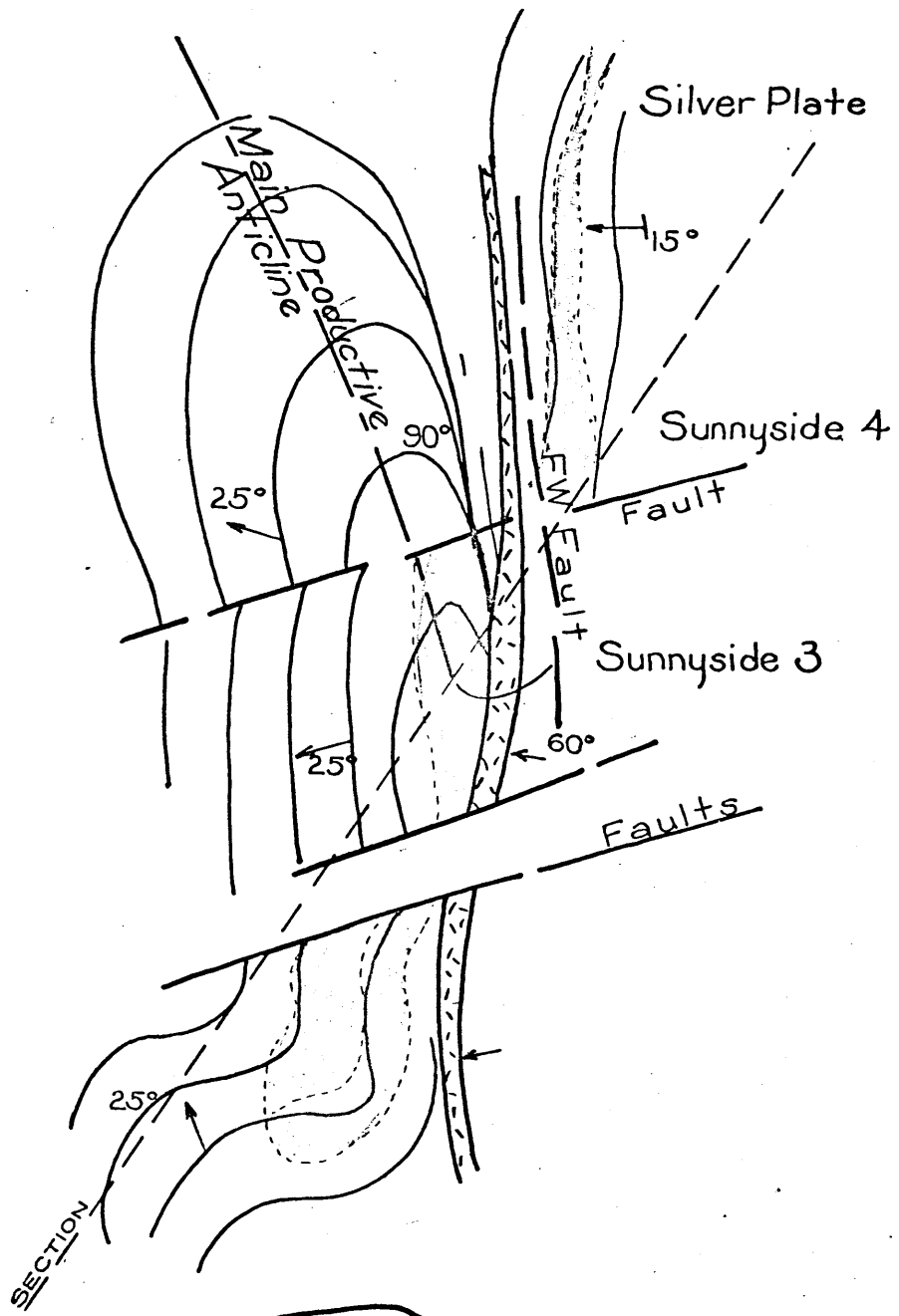
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to the northwest from the surface to the 17 Level. It is consistent throughout this distance, although toward the bottom the Flange Dike seems to merge into the Climax breccia funnel. It is interrupted by the cross structures, South and Central Fault zones, each of which drops the north side without otherwise affecting the pattern or the continuity of the mineralization.

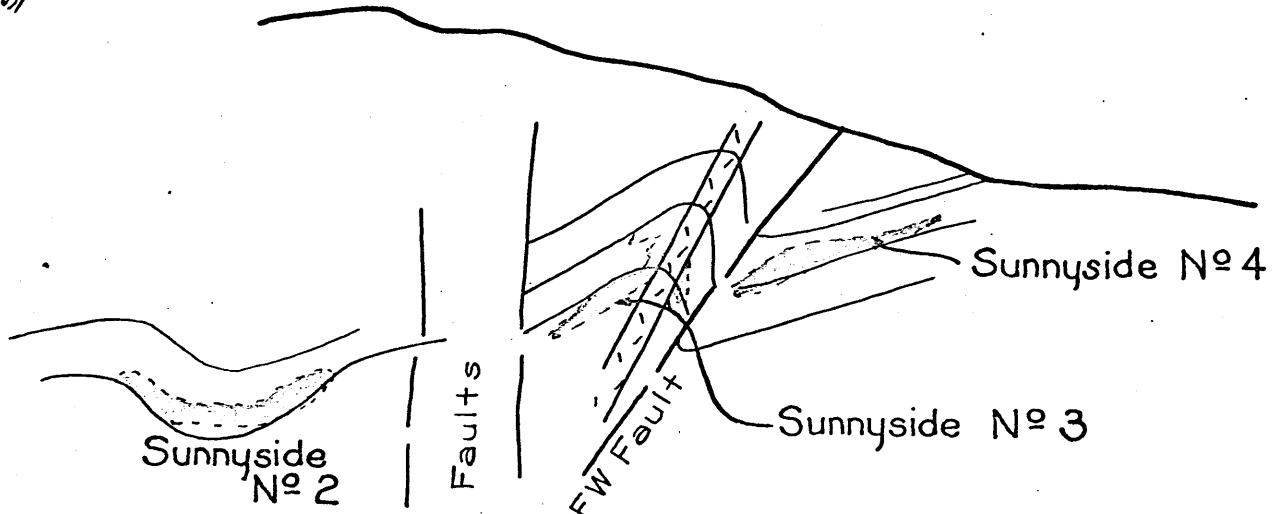
(e) The Main Productive Anticline itself has certain features which do affect the mineralization. In the first place, it is unsymmetrical, steeper on the northeast limb, so that its axial plane dips southwesterly and the crest of the anticline is found farther southwest in successively lower beds. In the second place, the fold itself is sharper in the lower beds. Its cross section is, therefore, like this:



The spread of mineralization is widest in the upper gentler part of the fold. The silica cap, shown on the surface sheet, extends 1500 feet, about 750 on either side of the axis. The upper purple ore bed (called Upper 1 on all maps), while only partially explored, seems to extend at



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least 400 feet. The lower beds are stoped to widths as follows:

				<u>Maximum</u>	<u>Average</u>
Purple	(old No. 1)-	-	-	250 ft.	200 ft.
Red	(old No. 2)-	-	-	200 ft.	150 ft.
Orange	(old No. 3)-	-	-	200 ft.	100 ft.
Yellow	(old No. 4)-	-	-	200 ft.	150 ft.
Sunnyside	-	-	-	60 ft.	50 ft.

All these beds have, beyond the existing stopes, fringes of lower grade ore. All are stoped to the maximum thickness on the axis of the fold.

9. The basic composite map extends southeast far enough to show the important Sunnyside workings. These lie upon the extension of the Main Productive Anticline, in the lowest beds of the Nickel Plate formation. The fold here is sharp, with the east limb vertical. A dike, the Sunnyside, supplies the equivalent of the Midway, and the main stopes lie on the nose of the fold adjacent to this (Sunnyside No. 3). Sunnyside 2 ore is extension ore along the west side of the dike, like much of the Orange ore in the Nickel Plate Mine. Sunnyside 4 ore is a fringe northeasterly beyond the fold, like that part of Upper 1 ore bed shown in the flat drill holes northeast of the Dickson Incline.

10. The separate level set, not geologically colored, is the basic set for the numbering of workings. Existing workings have been given numbers. All preceded by a letter, as A 15, are on the level of the same letter. Others are on the level of the first digit; i. e., 412 is on the 4 Level, 608 is on the 6 Level, etc. Intermediate levels, such as 4½ and 5½, receive numbers in the fifties and above; i. e., 451 is on the 4½ Level, 556 on the 5½ level.

11. New workings will be identified in the following form (not actual cases):

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e No 4

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<u>New Work</u>	<u>Starts From</u>	<u>At Coordinate</u>		<u>Direction</u>	<u>Progress</u>
		<u>N</u>	<u>W</u>		
828	810	1150	1275	S 75° W	20' June 15
1031	1002	1075	1310	N 20° W	41' June 15

Prints of each active level will be sent out periodically showing the new workings on that level in red, together with the geological objectives.

Respectfully submitted,

NICKEL PLATE MINE

List of Recommendations

No.	Date	Level	Name	Description	Purpose	Result
1	Sept., 1932	4½	451 Drift	Drift south on west side of Midway Dike to South Dike.	Basic drift toward prospecting area.	Finished.
2	Dec., 1932	4½	452 Crosscut and Raise	Crosscut east at 300 N. and raise along footwall of Midway.	To reach ore bed.	Finished. Ore.
3.	Dec., 1932	5	510 Crosscut	Crosscut to footwall Midway Dike from foot of ore chute.	To reach ore bed.	Finished. Ore.
Also	Mar., 1932	5	511 Drift 511 Raise	Drift south from 510 along Black Dike; raise on east side.	To reach ore bed half way up to 4½ Level.	Finished. Ore.
4	Dec., 1932	4½	454 Crosscut	Crosscut east at 400 N. to footwall of Midway.	To cut ore bed on 4½ Level.	Finished. Ore.
5	Dec., 1932 April, 1932	4½	455 Drift	Drift southeast along north side of South Fault to Sunnyside limestone.	Basic drift toward Sunnyside prospecting area.	Suspended while finishing short drives on 5 and 5½ Levels.
5a	Dec., 1932	4½	455 Raise	Raise along footwall Midway from 455 drift near start.	To reach ore bed.	Finished. Ore.
6	Mar., 1932	4½	456 Crosscut	Crosscut to footwall of sill on south side of South Fault.	To correlate formations on south side of fault.	Finished. Determines identity of Big Sill.

7	April, 1932	4½	457 459	Crosscut west from 451 on south side South Fault to find Midway Dike.	To pick up essential dike beyond South Fault.	Finished. Small dike found. If Midway, this is
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6	Mar., 1932	4½	456 Crosscut	Crosscut to footwall of sill on south side of South Fault.	To correlate formations on south side of fault.	Finished. Determines identity of Big Sill.
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7	April, 1932	4½	457 459	Crosscut west from 451 on south side South Fault to find Midway Dike.	To pick up essential dike beyond South Fault.	Finished. Small dike found. If Midway, this is petering out.
8	Mar., 1932	4½	458	Just south of stope, crosscut east through Black Dike; drift south on ore bed.	To find lower ore beds of No. 3 (Orange) formation.	Finished. Ore.
9	May, 1932	5½	555	From north side No. 8 Raise crosscut N. 60° W. through Midway to ore above 71 stope.	To cut unstoped block between 71 stope and 5 Level.	
10	May, 1932	5½	556	From northeast face crosscut due east to 279 drill hole.	To explore possible ore block between branches Central Fault Zone.	
11	May, 1932	4	410	Crosscut due west along 420 drill hole, just north of Central Fault.	To explore Upper 1 ore bed.	
12	May, 1932	2	210	Cut bench along north side No. 2 stope to hanging wall sill, then crosscut N. 60° W. to No. 1 (Purple) ore bed.	To explore extension No. 1 ore along nose of anticline.	
13	May, 1932	7	710	Crosscut from west side 71 stope due west along 293 drill hole.	To reach upper ore bed. of No. 3 (Orange) ore formation.	