

Nickel Plate Mine, Hedley, British Columbia

Notes on Essential Geology

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The apparent main controlling structure is the Midway sill. This is not bedded, nor is it everywhere porphyry, so the term is a misnomer. It is an angling thrust zone, cutting the formation at relatively small angles. It is a locus of porphyry intrusion, so that the zone is for the most part occupied by porphyry of somewhat variable size, but in places there is no porphyry. It appears to have been the main feeder zone, and was localized along a general zone of overriding drags as a thrust that rose through the bedding. From it spread sills, up and down dip from the Midway.

The Midway represents probably one of a series of ancient drag shears that served to thicken the pile of sediments on Nickel Plate Mountain. The Midway is one that remained active or reopened to permit formation of porphyry along it and remained active sufficiently to localize alteration and mineralization.

The Midway is structurally hot. The bedding is relatively uniform in the footwall but is complicated at the edge and in the hangingwall. The crumpling associated with the Midway is largely in the hangingwall overriding a relatively undeformed footwall, and it is in many instances the crumples that localize the ore. The crumples are not symmetrical or continuous as a rule - they may be localized within certain groups of beds.

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9245E062 Nickel Plate

The ore most directly related to the Midway tails out to assay boundary down dip on hangingwall and up dip on footwall.

Ore is not contained in rock completely converted to skarn, but in transition zone rock that is patchily or incompletely altered. Outside the transition zone is the marble line - that surface which delimits the occurrence of skarn and beyond which limestone is not altered. The marble line rises more steeply than the bedding and also climbs farther up the anticlines than the average. The occurrence of ore demands a conjunction of a hot feeder, the transition zone of incomplete skarnification, nearness of the marble line, which latter functions as the general most easily detected and followed feature. Beyond, or below, the marble line is the district footwall (DFW).

Sills are many, altered (bleached) and unaltered. It appears that ore will be found in zones of bleaching and not in association with the unaltered sills. In lower slopes of the canyon country the sills are unaltered, and it is presumed that one must get beneath them to find ore. These are termed turtle-backs of unbleached porphyry - they may cover a large area because they dip nearly with the slope.

The exploration work of recent years was to chase the Midway down into the canyon country, and as a first step a long drive was projected along the marble line. Unfortunately, timing was such that mapping did not keep pace with the driving, and so the drift got off onto the District

Footwall, and the work was stopped. It would not be very expensive to put the drive back on the marble line from which the transition zone could be tested and the Midway located. It is otherwise difficult to trace the Midway because it is not merely a porphyry or a shear but a locus of porphyry and of shear and brecciation, with no positively distinguishing characteristic - in places it may be simply unrecognizable. It would not be very far to come out in the Toronto area where mineralization is known.

Another phase of exploration was the mapping on 30 feet to the inch of the canyon country. This was done by several people, chiefly Yardley and Hogg. Hogg's work is the best. This was very difficult because of the excessive steepness, and the results are difficult to interpret because of the inadequacy of plans in such a situation. The problem is made more difficult on the lower slopes because of the large amount of (unbleached) porphyry which dips with the surface and obscures a great deal as single turtle-back sills.

The surface mapping traces the Midway part way down, or what is believed to be the Midway. Its continuation is in doubt, but it may be the Rollo thrust. The first move now would be to determine whether the Rollo thrust is the Midway (emerging under a turtle-back of porphyry).

Billingsley's surface compilation is a cutaway on contours to help visualize relation between geology and slope. Brown = unbleached porphyry, Green = bleached porphyry,

Pale Green = skarn, Blue = limestone, Yellow = silica. The lower sides of porphyry bodies are drawn with heavier lines to show relation to surface.

Not much ore is left in the mine - only the odd pillar and the odd face.

Sunnyside 4 orebody is 1 oz. grade and is below the District Footwall, and is the only one that is below it. Thence to the portal of No. 3 adit is good prospecting ground, along a shelf.

The Nickel Plate pattern and synthesis has emerged after a great deal of work and much detailed mapping. The mine to a visitor is most confusing as many workings and levels look alike, particularly in the Dixon territory. Many of the controlling structures cannot be seen. The amount of detail that has been mapped appears senseless to some, but it has paid off by locating ore many times.

The original surface showings on the Nickel Plate were not impressive as to size, although they were high grade. The remarkable thing about the early development was the placing of the Dickson Incline in just the right place for the main ore beds.

Conventional geology is of little avail. The structures are near bedded in a mass of heterogeneous sediments with no markers. The rocks are crumpled and sliced and shot with porphyry that is irregular and variable. Billingsley's concept of the process of deformation describes the thickening of the pile of sediments by drags and overriding,

and slicing by thrusts that cut the beds at small angles. The main loci of failure by rupturing were also loci of alteration, of porphyry, and of granite, and certain preferred loci of ore deposition.

The concept of "motion" is fundamental to an understanding of the whole integrated process. Activity in the mass of rocks at and near the time of mineralization was in preferred zones (such as the Midway) and deposition took place in preferred sites where stress differential existed such as tended to spread the bedding. Many of the ore-bearing crumples are so poorly defined, particularly in rock partly altered to skarn, that they have been repeatedly overlooked; some are so vague that it is difficult for the sceptic to be convinced they are ore structures; some are so assymetrical that the geometry is hard to determine, and yet the geometry is all important as a target for drilling; ore crumples are more the type that is localized within a local sequence of beds rather than the more continuous folds that involve major thicknesses of beds; many tail out or fade against porphyry, or terminate in a sharp flexure of drag nature, the recovery from which is into normal bedding.

The concept of ^{the} porphyry has been misquoted. The company belief is that some porphyry was fluid and some was "metamorphic". Crumpled structures have been traced through dykes; some porphyry grows more or less discontinuously along silicified breccia zones; some in the Toronto-Climax area is in thin sheets - an inch of porphyry, an inch of sediment,

repeated - so that core logging is 40 per cent porphyry or 60 per cent as the case might be; some was undoubtedly fluid, whether as primary or secondary melt is not known. The porphyry shunned the limestone and seemed in places to prefer siliceous rock.

It seems to be a fact that large sections of Nickel Plate Mountain are sliced by zones of thrusting that are sites also of alteration. The conjunction of circumstance that has made a Nickel Plate ore zone may occur elsewhere, and certainly the local occurrences of gold over a widespread area indicate the far reaching spread of gold-bearing solutions. The particular association with porphyry is probably not a necessity, as witness the French (Oregon) and supposedly Nighthawk where crumples without porphyry have localized ore. Also, arsenopyrite is not necessary as a gold carrier. The most important thing perhaps is a zone of rupturing, particularly when associated with one or more of: bleaching, skarn, silicification, intrusion. The French could be the tag end of a much larger zone, and some of the showings in the canyon country could signify something important.