

GEOLOGICAL SURVEY OF CANADA

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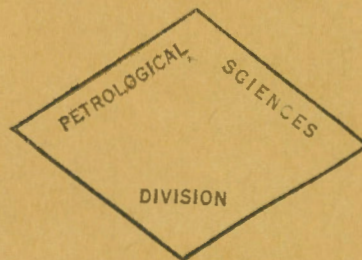
PRELIMINARY REPORT

SOUTH PART
FRASER RIVER-HARRISON LAKE
REGION,
BRITISH COLUMBIA

By

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GEOLOGICAL SURVEY

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INTRODUCTION

The south part of Fraser River-Harrison Lake region extends west from Fraser river between Hope and Yale to Harrison lake, and has an area of approximately 290 square miles. The two principal reasons for making an examination of the region were the presence of rock formations similar to those that, in Coquihalla region to the east, have prospecting possibilities, and the development of nickeliferous sulphide bodies at the B.C. Nickel mine between Stulkawhits and Emory creeks.

The east side of the area, along Fraser river, is served by the Cariboo highway and by the Canadian Pacific railway. The west side, bordering Harrison lake, may be reached by boat from Harrison Hot Springs at the south end of the lake. The northern and central regions are difficult of access except in those sections where roads or trails have been built. A 7-mile road up Stulkawhits creek has been built by B.C. Nickel Mines from Choate, on the railway, to the mine, at 3,500 feet elevation. A 4,629-foot tunnel through the mountain joins the mine camp and the road with Emory Creek trail. This trail is ~~suitable~~ suitable for pack-trains from the Cariboo highway to the tunnel. Continuations of the trail up the west fork, and up the northwest fork over to Old Settler mountain are suitable for back-packing. Short back-pack trails,

one up Gordon creek and two up Yale creek, are the only other means of getting into the country.

The region lies within the Coast Range mountains and is occupied by a range trending north-northwest. It is dissected by streams that run east to Fraser river and west to Harrison lake. Elevation varies from approximately 120 feet at the Fraser river at Hope to over 7,000 feet on Old Settler peak. The rough topography, the rather abundant rainfall, and the dense vegetation below elevations of about 5,000 feet make both prospecting and travelling difficult.

GENERAL GEOLOGY

The rock formations of the region range from Palaeozoic to Modern. The Palaeozoic formations are rather highly schistose sedimentary and volcanic rocks that underlie about half of the area. In general the rocks of sedimentary origin have been altered to quartz-biotite or quartz-hornblende schists, the volcanic rocks to hornblende or chlorite-carbonate schists. Before alteration, these rocks were probably sandy slates and andesites or dacites. They are generally fine-grained, dark grey or grey-green, and quite schistose. In the vicinity of Old Settler peak a narrow band of serpentine schist of possible intrusive origin is quite talcose in places and much lighter in colour than the bordering schists. As the band is quite small in extent it was mapped with the schists. Due to the sheared and metamorphosed nature of the schists it was impossible to obtain any information on regional structure. In general the rocks dip steeply and strike north, northwest, or west.

The schists are intruded by plutonic rocks of at least three ages. A narrow area bordering Fraser river is occupied by a light-coloured, coarse-grained rock that ranges from quartz diorite to granodiorite and in at least one place to granite. In most places this intrusive is highly sheared and somewhat altered. A stock-like mass at the headwater of Boulder creek is a grey-pink, coarse-grained, gneissic augite diorite.

Following the first intrusion of plutonic rocks, a conglomerate, probably of Cretaceous age, was laid down. It occurs in the southeastern part of the area as a long, narrow strip paralleling Fraser river and overlying Palaeozoic rocks and the early diorites. It is made up principally of materials derived from the diorite, with a small proportion of pebbles from the Palaeozoic series.

On the ridge between Stulkawhits and Emory creeks there is a small mass of hornblendite believed to be an early basic segregation of the dioritic intrusives that follow the Cretaceous(?) conglomerate in age. This mass occupies an irregular area of approximately $1\frac{1}{2}$ square miles and contains the nickeliferous sulphide deposits that are being developed by B.C. Nickel Mines. Hornblendite is the principal rock type of the mass, but variations to pyroxenite are common. Normal hornblendite is a coarse-grained, black rock and the pyroxenite is bronze-grey. Other small bodies of this rock were located on both Emory and Gordon creeks. The diorite associated with, but slightly later than, the hornblendite is a coarse-grained, grey to white rock that occupies the central part of the area. In general this rock is a quartz diorite, but in places near other formations it shows

variations. Close to some areas of schists it becomes more basic and may be termed gabbro, near others, it carries up to 20 per cent of garnet, suggesting that it has incorporated some of the schist. In the vicinity of hornblendite masses it varies to a norite or a gabbro. Definite intrusive contacts with the schists, the early diorite, and the hornblendite, are common.

The youngest intrusive rock is a small stock in the north-central part of the area. It is a fine- to medium-grained, grey, quartz diorite, that intrudes the diorites just discussed. A diorite porphyry dyke cuts the stock on the northwest but is believed to be closely related in origin because such dykes are commonly associated with similar stocks to the north. Basic dykes of dioritic composition, found in a few places, are believed to belong to the same period of intrusion as the stock and the diorite porphyry. They are fine-grained, black rocks.

Stream gravels with some interbedded sand occur in the benches along the banks of Fraser river. The majority of the boulders are under a foot in diameter. The formation was laid down after the last Ice age by the Fraser river which then occupied a channel some 200 feet above its present level. As the river deepened its channel the gravel deposits were left as benches and terraces on either bank.

ECONOMIC GEOLOGY

The Palaeozoic schists and the band of serpentine in the vicinity of Old Settler peak are the only rocks in which quartz veins are well developed. In general the veins

are poorly mineralized at the outcrop, but some contain small amounts of gold and silver. Some of the quartz veins are 5 to 6 feet wide and fairly persistent along the strike, but most of them are smaller and have a tendency to pinch and swell. Small amounts of pyrite, chalcopyrite, and sphalerite have been noticed in some of them. The country below 5,000 feet is rugged and heavily wooded and has not been thoroughly prospected, so that its possibilities are far from exhausted.

The hornblendite, especially the large mass between Stulkawhits and Emory creeks, contains important bodies of nickeliferous sulphides. Work at the B.C. Nickel mine has indicated that these bodies are more or less haphazardly arranged like plums in a pudding and cannot be correlated with any structural feature. Pyrrhotite is the most abundant sulphide, chalcopyrite is second in quantity, and pentlandite third. The sulphides occur as massive bodies in which there is about 40 or 50 per cent gangue, as disseminated bodies, and as small veinlets. The content of the nickel and the copper is variable and only massive bodies with more than 1 per cent nickel and 0.4 per cent copper have been classed as ore. The disseminated sulphides and the veinlets are not of economic importance. Ore-bodies of the massive type have been located, as yet, only at the B.C. Nickel mine.

The Fraser River gravels were important placers in 1858 and for a few years following. The bars in and along the river channel were first washed for gold, and later some of the benches on the banks of the river were worked. When the more profitable bench deposits for which a good supply of water was available were washed the

placer miners moved on to more favourable fields. Benches not worked at that time, therefore, may now yield paying quantities of gold. A few prospectors with rockers or short sluice-boxes were obtaining small amounts of gold during the summer of 1935. It is possible that a black sand concentrate carrying enough gold to warrant the work can be made. Small amounts of placer gold occur for short distances up the creeks that run into Fraser river.

Mining Properties

B.C. Nickel Mines hold a group of 117 claims and fractions on the hornblendite mass that lies 7 miles by road up Stulkawhits creek from Choate on the Canadian Pacific railway. Bodies of nickeliferous sulphides have been located and developed by surface trenching, by magnetometer work, and by drifting, crosscutting, raising, and diamond drilling. Underground workings consist of two adit tunnels: No. 1 at 3,530 feet elevation; No. 2, 1,000 feet east of No. 1 and at 3,275 feet. No. 1 adit is 4,629 feet long and in addition has seven crosscuts that total 7,145 feet in length. No. 2 adit is 2,321 feet long but has no important crosscuts. In October 1935 no work was being done in the No. 2 adit. The drifting program for No. 1 adit was practically complete and raises were being put in with the object of establishing levels at 150 and 300 feet above the adit level. Work in five raises totalled 313 feet on October 13, 1935.

Development work has indicated thirteen bodies of ore of various sizes outcropping on the surface, ten bodies in No. 1 tunnel, and one small body in No. 2 tunnel. The company estimates about 1,000,000 tons of ore that

averages 1.3 per cent nickel, and 0.4 per cent copper. Small amounts of cobalt, gold, silver, platinum, and palladium are also present. The principal minerals are pyrrhotite, chalcopyrite, pentlandite, pyrite, chromite, and magnetite.

The hornblendite varies from a pure hornblendite rock to a hypersthenite or, as it is locally known, a pyroxenite. The entire mass, approximately $1\frac{1}{2}$ square miles in area, has been cut by dykes and irregular masses of the slightly later diorite. Tension faults that cross the mass in north-northwest to north-northeast directions have produced some displacement. The major movement was along faults that dip 50 to 60 degrees east, but there was also a little movement along faults dipping 45 to 55 degrees west. All the faults are of the normal type, i.e., the hanging-wall side moved downward. The mineral deposits appear to be magmatic segregations somewhat enriched by the small fissure veins which are definitely later in age.

Fort Hope Mines hold a group of eight claims that lie between the Cariboo highway and the Canadian Pacific railway about $1\frac{1}{2}$ miles north of Haig station. Open-cuts on the hillside 280 feet above an adit at the track expose a 12-foot quartz vein sparingly mineralized with chalcopyrite and pyrite. The adit, which has been driven more than 850 feet through altered diorite and schist, cuts an 11-foot quartz vein at approximately 540 feet from the portal. This vein is also sparingly mineralized with pyrite and chalcopyrite. Although high assays in gold, silver, and lead have been reported, no indication of such a type of mineralization was found. No work was done on the property during the summer of 1935.

Ideal Gold and Nickel Mines hold a group of twenty-eight claims that extend from Schkam lake on the Cariboo highway about 4 miles north of Hope to 1,500 feet north of American creek. An adit has been driven in sheared Palaeozoic rocks near their contact with granites. The adit, which was approximately 800 feet long in June 1935, cuts across beds that strike north 10 degrees west and dip 35 degrees east. Bands of sheared quartz carrying some pyrite occur in the sediments and in general parallel the bedding. Although gold and silver have been reported, assays of channel samples taken by the British Columbia Department of Mines across a 30-foot zone of quartz between 190 and 220 feet from the portal, and a 3-foot zone at 331 feet, show only a trace of each. Pods or small lenses of quartz carrying some pyrite were noticed along a diorite dyke in an opencut on the hillside above the adit. The company was continuing the tunnel during the summer of 1935.

Western Nickel claims are on the south side of Gordon creek about 3 miles by trail from the Cariboo highway. A 45-foot adit driven into a small body of hornblendite cuts patches of disseminated pyrrhotite, chalcopyrite, and pyrite. The pyrrhotite is said to be nickeliferous. The hornblendite mass was being prospected in 1935.

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