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GEOLOGICAL SURVEY

PRELIMINARY REPORT

EAST HALF, FORT FRASER MAP-AREA, BRITISH COLUMBIA

BY

J. G. Gray

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Preliminary map. Mineral occurrences, East Half, Fort Fraser Map-area.

EAST HALF, FORT FRASER MAP-AREA, BRITISH COLUMBIA

By J.G. Gray

INTRODUCTION

The eastern half of Fort Fraser map-area embraces 2,400 square miles of territory lying between latitudes 54 degrees and 55 degrees north and longitudes 124 degrees and 125 degrees west. The area lies along the western edge of the Nechako Plateau, which is a subdivision of the Interior Plateau region of British Columbia.

The southern part of the area is traversed by the Prince Rupert branch of the Canadian National Railways, and also by the Prince George-Hazelton highway. Vanderhoof, Fort Fraser, and Fraser Lake are the principal towns in the area.

A good motor road, 40 miles long, runs north from Vanderhoof to Fort St. James. A road extending north from Fort St. James to Manson Creek runs parallel to the eastern boundary of the map-area. Trucks can be used on this road, but only the southern 30 miles is suitable for automobiles. There are many wagon roads in the area and some of these are suitable for motor travel in dry weather.

A water route to Takla Lake extends through the area by way of Stuart Lake, Tachie River, and Trembleur Lake. Regular freight service is maintained on this route, which is navigable by shallow draft boats throughout the summer season. Three short rapids occur on Tachie River and travellers who are unfamiliar with the river usually engage a pilot at the Indian village of Tachie for this part of the route. The village is located at the mouth of Tachie River. River boats may be obtained at Fort St. James.

Travel on Tezzeron and Inzana Lakes, which lie in the northern half of the map-area, is restricted to Indian canoes. These lakes are subject to frequent squalls and this type of travel is not safe for those inexperienced in handling a dugout canoe. A light boat may be portaged from Stuart Lake to Pinchi Lake from the Indian village of Pinchi.

There are many foot trails throughout the area, but most of them are in poor repair. A trail suitable for pack-horses extends between Trembleur Lake and Inzana Lake. There is also a good pack-horse route from Fort Fraser to Babine Lake by way of Ormond Lake and Sutherland River Valley. The part of this route between Fort Fraser and Ormond Lake is suitable for wagons. Pack-horse outfits may be hired at Fort Fraser, Vanderhoof, and Fort St. James.

Fort St. James is the base for airplane traffic to the northern mining fields, and planes are available throughout the year. The air route from Fort St. James to Manson Creek crosses the northern part of the map-area.

PREVIOUS WORK

Previous geological work in the area has been chiefly of an exploratory nature.

The rocks in the vicinity of Fort St. James have been described by A.C. Selwyn[1] and G.M. Dawson[2]. Camsell[3] has described

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[1] Report on Exploration in British Columbia; Geol. Surv., Canada, 1875-76, p. 78.

[2] Geol. Surv., Canada, Ann. Rept. 1876-77.

[3] Camsell, C.: Geol. Surv., Canada, Sum. Rept. 1915.

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the geology along the route from Vanderhoof to Takla Lake via Stuart Lake and Tachie River.

A cross-section along the southern boundary of the area by way of Nechako River, Fraser Lake, and Stellako River Valley was traversed by Dawson, who also made an excursion in a northeast direction from Fort Fraser to Stuart Lake[4].

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[4] Op. cit., pp. 51 and 55.

The geology along the railroad has been noted by Kerr[1].

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[1] Kerr, F.A.: Mineral Resources along the Canadian National Railway, between Prince Rupert and Prince George, British Columbia; Geol. Surv., Canada, Paper 26-20 (1936).

Some of the mineral occurrences in the area have been described in annual reports of the British Columbia Minister of Mines[2].

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[2] Annual Reports, Minister of Mines, B.C., 1921, p. 109, and 1929, p. 186.

OUTLINE OF GEOLOGY

The rocks of the map-area may be divided into four main groups.

Group No. 1 is of Tertiary age and consists mainly of vesicular basalts and andesites, with minor amounts of rhyolite, tuff, and flow breccia, and some fossiliferous clastic sediments. The volcanic rocks extend from Fraser Lake on the south to Sutherland River Valley and Bud and Saddle Mountains on the north, and cover an area of 450 square miles. They may be easily distinguished by their red, green, and black colours and vesicular character. They are well exposed in the vicinity of Fraser Lake. The sedimentary part of the group occurs at the east end of Fraser Lake and consists of sandy and shaly beds containing lignite seams.

Group No. 2, which is composed of sediments of Carboniferous age, can be divided into an upper and lower division. The lower division consists of thinly bedded argillites and quartzites with some metamorphosed volcanic material, serpentine, conglomerate, and greenstone. The upper division is composed chiefly of siliceous, blue-grey limestone.

The lower division is exposed over 30 square miles in Nechako River Valley in the vicinity of the second canyon on the river, 6 miles northeast of Fort Fraser. A narrow, northwesterly trending belt of the same series of rocks extends along the south-facing slope of Sutherland River Valley, and covers an area of 24 square miles. On the north they are in contact with a large body of hornblende diorite. On the south the rocks of this belt are overlain by the volcanic rocks of group 1.

A belt, 5 miles wide, of the lower division extends along the southwestern shore of Stuart Lake. In addition to the ordinary rocks found in this division, the belt contains thin beds of white limestone. On the south the belt is intruded by a large body of hornblende diorite.

The upper limestone division of the group forms a well-defined band trending northwesterly across the middle of the map-area. The band has an average width of 4 miles. Its southern limit is defined by Stuart River, Stuart Lake, Tachie River, and Trembleur Lake. For most of its length it forms a well-defined mountain ridge, of which Mount Pope on Stuart Lake is the highest point.

Group No. 3 consists of intrusive masses, chiefly of granitic types. They are intermediate in age between the Tertiary volcanic rocks and the Carboniferous sediments, and are probably Mesozoic.

One of these masses is in the southwest corner of the map-area and is well exposed in the vicinity of the west end of Fraser Lake. It consists of a coarse-grained, pink granite with large, well-developed feldspar phenocrysts. Small areas of the intrusive differ in composition and texture, but on the whole the mass is quite uniform. The mass extends south of Fraser Lake to the southern boundary of the map-area and as far north as Justine Lake. A small area of granite is exposed on the north shore of Fraser Lake at its eastern end.

A second large and fairly well exposed intrusive mass, 7 miles wide, and at least 25 miles long occurs north of Sutherland River Valley. It is in contact with the Carboniferous sediments along Sutherland River on the south and the Stuart Lake belt of Carboniferous sediments on the north. The southern contact is well exposed. This intrusive mass, which is composed of medium-grained, uniform-textured, light grey diorite, occupies an area of at least 175 square miles.

A third intrusive mass is a small granite stock located a short distance south of Tremblour Lake and just west of Tachie River. The body has an area of 7 square miles and intrudes sediments of Carboniferous age.

Besides the granitic intrusives there are two fairly large intrusive bodies of serpentine. One of these composes Murray Mountain, a few miles north of Fort St. James. The second forms the flat-topped mountain lying between Pinchi and Tezzeron Lakes. The serpentine of both masses is characterized by its rusty brown colour, the blocky manner in which outcrops weather, and the flat-topped ridges that it forms. The rock is coarse-textured and composed chiefly of serpentine with small amounts of olivine and magnetite. Each mass occupies an area of approximately 15 square miles.

Group No. 4. The rocks of this group are chiefly massive andesites of extrusive origin. They are non-vesicular and are of fairly uniform texture. Chilled, fine-grained phases of the rock were observed in the vicinity of Pinchi Lake and north of Inzana Lake. On the north shore of Pinchi Lake these rocks are in contact with the older Carboniferous limestone, which extends to the south. In some places, chiefly in small areas in the vicinity of Inzana Lake and in the northeast corner of the sheet, the andesite carries phenocrysts of hornblende. The andesite contains much pyrite and hills composed of this rock may be easily recognized by their rusty brown colour, which is caused by the oxidation of the pyrite.

The andesitic group extends from Tezzeron and Pinchi Lakes to the northern boundary. The andesite is definitely younger than the Carboniferous rocks. In places it is considerably sheared, which would suggest that it may be older than Tertiary. It is here considered to be Jurassic in age. No rocks of the same type were found in the Tertiary series of volcanics exposed in the southern part of the map-area.

Lookout Mountain, 12 miles north of Murray Mountain, is composed of a vesicular basalt flow breccia. This rock was not found to be in contact with any other rock type, but it appears to overlie the andesite, and is probably younger.

MINERAL OCCURRENCES AND PROSPECTING POSSIBILITIES

Some prospecting has been done in the area, but except for a small amount of placer gold there has been no production from any of the discoveries, and the ore deposits so far discovered are small. As there is a thick mantle of glacial drift and vegetation over the greater part of the map-area, prospecting has been confined to relatively small areas. The large area of vesicular, Tertiary volcanics may be considered to lack ore deposits.

Manganese

A deposit of manganese was discovered and staked in 1934 by Mr. B. Tead of Fort Fraser. It is located 1¼ miles due north of the second canyon on Nechako River below Fraser Lake, or 5½ miles northeast of Fort Fraser. The manganese occurs as pyrolusite and psilomelane, and lies in folded, cherty, Carboniferous quartzites which outcrop over an area of 4½ square miles in this region. These rocks trend northwest and normally dip steeply to the northeast.

On Mr. Tead's claim, the manganese oxides have been exposed in two places. A shaft has been sunk to a depth of 9 feet on the more important showing and at the bottom of the shaft the oxides give way to sandy, yellow clay. The pyrolusite and psilomelane with thin seams of sandy, yellow clay form a small lens having a maximum width of 4 feet and a length of 10 feet. Manganese oxides are the only metallic minerals present. The purest material from the shaft is reported to assay 70 per cent manganese.

The second exposure of manganese is in a small open-cut 4 feet deep, located 60 feet south of the shaft. At this point the rocks are mineralized across a width of 3½ feet, but the concentration of manganese is considerably less than in the shaft. Individual quartzite beds up to 2 inches in width have been almost completely replaced by manganese oxides.

Observations were made along the strike of the rocks north and south of the shaft and open-cuts, but no evidence could be found to indicate that the two showings were continuous or that they extend any distance beyond where they are exposed. The rocks in the vicinity are stained on the surface with manganese oxide.

During the summer of 1936, Mr. Godwin, of Fort Fraser, and his associates discovered a concentration of manganese oxides at a point approximately one mile northeast of Tead's property. The manganese oxides fill small, irregular fractures in the country rock along the side and bottom of a small, steep-walled gully in fractured rocks of Carboniferous age. The mineral concentration is greatest where there is the most fracturing, and in places small pockets occur which contain ore of reasonable purity. Trenching has been done in the vicinity of the gully, but it has not indicated the presence of an ore-body. There is considerable manganese stain on the rocks.

The Tertiary volcanics lying north and west of the Carboniferous sediments in which the manganese deposits occur are stained with manganese oxides, and presumably manganese is a constituent of one or more of the minerals forming these rocks. Possibly the Tertiary volcanic rocks have yielded manganese to surface waters which deposited the manganese oxides in fractures and elsewhere in the Carboniferous rocks. If this is the mode of origin, the Carboniferous rocks, since they are the most shattered, offer the best possibilities, and search should be made near the contact of these rocks and the volcanics. Local depressions of the topography along the contact zone would be especially favourable.

Antimony

A quartz vein containing stibnite (sulphide of antimony) was discovered near Stuart Lake in 1928. The vein is approximately one-half mile inland from the bay directly behind Beaver Island on the south shore of the lake, 10 miles west of Fort St. James.

The showing is on the south side of a low, timbered ridge trending parallel to the lake. An adit has been driven 30 feet into the ridge and intersects the vein at a point approximately 15 feet below its outcrop. The entrance to the adit is caved and almost completely blocked. At its point of intersection the vein is 12 inches wide and well mineralized with stibnite. The vein lies in a sheared zone of impure quartzites and argillites. It strikes northwest and dips steeply to the north, following the attitude of the sediments.

Stibnite occurs in the quartz vein filling and as small, kidney-shaped masses in the sheared wall-rocks. These masses consist

of acicular stibnite with a small amount of quartz and pyrite. The vein filling is vitreous and drusy quartz with well-developed crystals. The vein contains the green micaceous mineral mariposite, which is closely associated with the stibnite and may serve as a valuable guide in prospecting for antimony in this area. Mariposite is found in the wall-rocks as well as in the veins. Much float containing it occurs along the ridge on which the vein outcrops. The soil in the immediate vicinity of the outcrop has a distinctive reddish brown colour, which is probably caused by the weathering of stibnite.

Approximately 1,000 feet to the east of the prospect adit, an outcrop of a drusy quartz vein was found. This vein and the rocks in which it occurs were found to contain much mariposite. It is exposed on the south slope of a low ridge of impure quartzite. The soil in the immediate vicinity of this outcrop is of a reddish brown colour similar to that in the vicinity of the adit. Although no stibnite was seen here it is possible that subsurface prospecting would reveal the mineral. This vein trends in the same direction as the one in the adit and has the same characteristics. It is possible that they are outcrops of the same vein, but this could not be established as the area between the outcrops is covered with drift.

The property, which is known as the McMullen group, was examined by Douglas Lay[1] while development work was being done. He

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[1] Annual Report, Minister of Mines, B.C., 1929, p. 186.

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reports that the vein in the adit has been followed by a shaft 20 feet deep and that a sample across 12 inches assayed: gold 0.16 ounce to the ton; silver 0.4 ounce to the ton; lead 9 per cent; antimony 20 per cent.

It has been reported that stibnite discoveries have been made on the western slope of Mount Nielsp, the peak of which lies 2 miles west of the McMullen property. However, no such deposits were seen there while traversing that part of the area, and no claims have been staked. Many narrow quartz veins were noted on the western slope of the mountain and in the vicinity of Pam Lake, but they contain only a small amount of pyrite. These veins occur in rocks of the same age as those on the McMullen property. It is possible that stibnite veins occur in the vicinity of Mount Nielsp.

Mercury

During the course of the field work cinnabar (sulphide of mercury) was discovered by the writer on the north side of Pinchi Lake, on the crest of a small hill that rises abruptly from the northern shore of the lake, directly north of a small limestone island located 6 miles from the west end of the lake. An old blazed line, evidently a land survey cutting, runs across the top of the hill. The cinnabar is exposed at a point on the blazed line where it starts down the west slope of the hill.

The mineral occurs in massive, silicified, blue-grey limestone. It is disseminated along small fractures in the limestone and to some extent replaces the rock. Due to surface weathering, the mineral is of a chocolate-brown colour and shows the characteristic scarlet colour of cinnabar only when scratched or broken. At this place rock outcrops over an area of some 250 square feet and cinnabar occurs here and there over this area. An examination of the rocks in the vicinity of the outcrop did not disclose more cinnabar. The area can be reached easily in a day from Fort St. James. Rock outcrops are plentiful and the area could be prospected with very little difficulty.

The mercury is probably related to the series of volcanic rocks that are in contact with the limestone near the eastern end of Pinchi Lake. Prospecting should be done along this contact as well as in the vicinity of the cinnabar occurrences.

Magnesite

Pure magnesite was discovered at a place one mile north of Pinchi Lake and 3½ miles from the west end of the lake. The outcrops occur along the contact between blue-grey limestone and a large body of serpentine. The magnesite does not outcrop continuously, but occurs in short lenses along the contact. It is particularly well developed on the face of a conspicuous white cliff that is readily visible from the south shore of Pinchi Lake. The cliff is 50 or 60 feet high and 150 to 200 feet long, but is not all composed of magnesite.

Quartz Veins on Trembleur Lake

Along the south shore of Trembleur Lake, in the vicinity of the outlet to Tachie River, there are many quartz veins cutting impure quartzite with thin, argillaceous beds. The rocks have been folded and faulted, and graphitic and quartz-mica schists occur in disturbed zones. Many large, pyrite-bearing diorite dykes also cut these rocks.

The veins are from 2 to 14 inches wide and contain small amounts of pyrite. A small amount of galena was noted in one vein. Some of the veins follow the bedding planes of the rocks and others crosscut them. Some lie along fault planes. A few quartz stringers cut across the dykes.

The veins are probably related to an intrusive granite stock of about 3 square miles in area that lies 1½ miles south of the lake shore. Prospecting in the area of sedimentary rocks surrounding the granite might lead to the discovery of veins carrying minerals of value. The area surrounding the granite is rough and heavily timbered, but rock outcrops are fairly numerous.

Quartz Veins on the South Shore of Stuart Lake

The rocks along the south shore of Stuart Lake are conglomerates, impure quartzites, argillites, and carbonaceous schists with small amounts of serpentine and greenstone. Many quartz veins cut these rocks, but those seen are short, narrow stringers. In places they are rust stained, but with the exception of a little pyrite they are barren of sulphides.

Quartz Veins on North Shore of Tezzeron Lake

A quartz vein occurs on the north shore of Tezzeron Lake at a point 4½ miles from the west end of the lake. The vein outcrops at the lake edge and extends into the water and may be examined only when the lake is low. It is 2 feet wide and about 20 feet of its length is visible.

Fine-grained pyrite and arsenopyrite are disseminated along small fractures in the quartz. Galena and sphalerite in small amounts were noted, but these minerals are not abundant. An assay of a sample taken across the width of the vein indicated the presence of traces of gold and silver.

Considerable quartz float was noted on a low ridge 200 feet north of the outcrop of the vein on the lake shore, but no vein was seen on this ridge. No sulphides were noted in the float.

The country rocks in the vicinity are steeply dipping, thinly bedded, dark quartzites and slates and a younger dark green, fine-grained, massive andesite. The vein is in the andesite and considerable brecciation occurs along its walls.

A few stringers of quartz cut the andesite along the lake shore west of the vein, but are barren of other minerals.

Shass Mountain Prospecting Area

Shass Mountain, locally called Grizzly Mountain, lies north of Sutherland River and near the western edge of the map-area. Thinly bedded, steeply dipping chert, quartzite, and argillite, with minor amounts of serpentine and dyke rocks, extend along the southern slope of Shass Mountain. On the north these rocks are in contact with a hornblende diorite batholith. Along this contact the sediments have been altered to schists.

The sediments form an elongated belt 12 square miles in area. Good exposures of the sediments occur on the creeks that drain across the belt into Sutherland River.

On Gravel Creek, at a point slightly more than a mile upstream from where it is crossed by the Sutherland River trail, a large, rust-stained quartz vein was observed. It parallels the bedding of the sheared argillites that outcrop on the east side of the creek. A sample of the vein was crushed and panned, but no metallic minerals were found. However, as the vein is very badly decomposed and contains much iron rust, it is probable that any sulphides that may have been present have been removed by weathering. Stripping of the oxidized material might disclose sulphides in the unoxodized part of the vein. The vein is exposed only on the east side of the creek, where it is 3 feet wide and strikes in a northwesterly direction.

On the second creek to the east of Gravel Creek, a large quartz vein was noted at a point 2 miles upstream from the Sutherland River trail crossing. The vein is 3 feet wide and is exposed in the

creek bottom. It strikes slightly west of north and is sparsely mineralized with pyrite. The rocks at this point are impure quartzite and argillite with much disseminated pyrite.

Half a mile upstream from the above vein there is an exposure of a medium-grained, granite pegmatite composed of feldspar, quartz, and a small amount of brown mica. The rock carries pyrite and sparsely disseminated molybdenite. It is exposed for a distance of 100 feet along the west bank of the creek and much float extends downstream from the outcrop.

There were very few rock exposures along the creek north of the pegmatite mass and no further metallic minerals were seen in this particular area.

In general, the northern valley slope of Sutherland River may be considered favourable prospecting ground. The rocks comprise a sedimentary, metamorphic, and igneous complex. In places they are much pyritized and it is reasonable to expect that there are more veins and mineralized bodies in the area. Many good rock exposures occur, and careful prospecting in the area might lead to important discoveries.

The area is easily accessible and can be reached by a good trail from Fort Fraser, 35 miles to the southeast.

Placer Gold on Dog Creek

Dog Creek flows into Stuart River and crosses the Fort St. James highway at a point 11 miles south of the Stuart River bridge. Placer workings are located 5 miles upstream from the highway crossing. A wagon road leads from the highway to the workings.

Gold was discovered in the creek in 1931 and several claims were staked, but only a small amount of mining was done. In 1937, at the time of the writer's visit, work was being carried on by one prospector. The gold is fine and flaky. It occurs in a layer of gravel overlying a clay seam 12 to 18 inches thick. The seam is slightly higher than the present creek level. A small amount of gold also occurs in rudely stratified glacial gravels that form low terraces along the creek valley. Only the gravels above the clay seam are mined, as gold has not been found to occur below it in paying quantities. Most of the gold is obtained from around large boulders lying on the clay.

The claim on which the most gold was found is on a small, flat area lying a short distance downstream from where the creek has cut through glacial drift 60 feet thick. This section cut in drift extends for approximately one mile upstream and is locally referred to as "the canyon". Above "the canyon" the creek is small and slow moving, as it flows through swampy, drift-covered country. Bedrock was not found at any point along the creek.

Placer Gold on Sowchea Creek

Sowchea Creek is fairly large and has an extended drainage system. Placer gold has been recovered from gravels on three claims, but no important production has been reported. One claim is located 4½ miles upstream from the creek mouth. At this point a prospector is working on a small, flat area through which the creek flows. He reported that the gold concentration is greatest in the lower 3 to 4 feet of gravel, below which a clay seam is encountered that has acted as a false bedrock. Some gold is present in the gravel below this seam, but there is considerably less than there is above it. The gold is fine and is associated with considerable black sand. Similar conditions exist on the other two claims on the creek. Only the gravels overlying the clay seam are worked.

The gold is probably being concentrated from the glacial drift through which Sowchea Creek has cut its channel. Gravel terraces occur 100 to 150 feet above the present creek level and much gravel has been worked over by the creek in establishing its present course. The creek and its tributaries drain an area underlain by diorite.

In prospecting for further placer gold deposits on Sowchea Creek, locations should be examined where there is a local flattening of the creek gradient and a widening of the valley bottom. These conditions exist at the three places where gold has been found.

Many other creeks in the map-area drain areas thickly covered with glacial drift. However, most of them are small and it is doubtful if gold will ever be profitably recovered from them.

Coal

A number of narrow coal seams are exposed in the large railroad cut at the east end of Fraser Lake. A company was organized, in 1921, to investigate the occurrence, but after doing a small amount of development work the project was abandoned[1].

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[1] Annual Report, Minister of Mines, B.C., 1921, p. 109.

The seams occur in Tertiary sediments overlain by basalt. They vary in width from 6 to 12 inches, but much shale is mixed with them. The coal is of the lignite variety. It slacks very rapidly on exposure to air and is not suitable for commercial use. The formation in which the coal occurs is not sufficiently extensive to contain any large deposit even if it were of good grade.