GEOLOGY

VICTORIA MTN - MT NANSEN AREA

YUKON TERRITORY

MOUNT NANSEN MINES LIMITED

by

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FORM NO. L42-811-P REPORT PAPER - GRAND & TOY LIMITED

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SUMMARY

The lithology of the area and to a lesser extent the structure have been described by Bostock, and much of the ensuing report is a series of extracts from his memoir no. 189. On the accompanying map his rock units are drawn, and superimposed are the numerous faults evident on the aerial photographs. The various orogenies have yet to be analysed, and the same is therefore said of the fault patterns.

Mineralization, being late stage, may be encountered in any of the fault sets. Discrimination will best be made from data gathered in the field.

INTRODUCTION

The present project is designed to add structural data, as seen on aerial photographs, to existing data on lithology.

Mount Nansen Mines Ltd. is currently prospecting between Nansen and Victoria creeks. The accompanying map, which provides a regional setting covers an area some 15 miles square centered somewhat to the north of the prospects, midway between Dawson and Whitehorse. The SE of the area is a couple of miles north of Lat. 62°00'N, Long 137°'W.

The Nansen and Victoria creeks area was mapped by D.D. Cairnes, resulting in G.S.C. Map 151A at the one mile scale. Map 340A, which accompanies H.S. Bostock's 1936 Carmacks memoir (G.S.C. Memoir 189), at the 4 mile scale, shows the same contacts, with a somewhat modified legend.

The aerial photographs used in the study were provided by the National Air Photo Library at a scale of about 3000 ft. to the inch. The base map compiled from the centres of these photographs suffers from the distortions inherent to any such direct transfer of data which is distorted because of rugged terrain.

GENERAL GEOLOGY

H.S. Bostock gives admirable descriptions of the surficial geology, lithology and structure of the various parts of the Carmacks district. Those which pertain have been extracted verbatim in the following resume.

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Surficial Geology

"Yukon territory includes parts of three major physiographic provinces, namely, the Coast Range province on the southwest, the Yukon Plateau province in the south-central part, and the Mackenzie Mountain province to the north and east of the plateau. Carmacks district lies in the central part and wholly within the Yukon Plateau province.

The area included in the plateau is by no means flat, but exhibits a relief of 2,000 feet and more."

"Along the divides the general elevation rises and many high points, such as the mountains of the Dawson range, have not been reduced to the level of the upland and still stand well above it.

The upland surface is best seen on the southwest side of the Dawson range about the headwaters of the streams, where it has been least modified. Here its elevation is between 4,000 and 5,000 feet and streams such as Klaza river and its main tributaries have cut their valleys 1,000 to 1,500 feet below the general level."

The entire area lies west (i.e. outside) of the area covered by the most recent glaciation.

"The drainage of the district is of the trellis type. This is distinct in almost every part of the district, but particularly in the unglaciated area. Two directions, northwest and northeast, are predominant..... An interesting feature is the converging, fan-like drainage arrangement along the southern border of the district in the vicinity of Nansen creek."

"The phenomena that most definitely seem to belong to an earlier glaciation are those found in the vicinity of Nansen creek. A boulder clay .... occurs in this area and is covered by deposits of normal erosion. The surrounding country shows no other sign of glaciation except some changes in drainage. The slopes are typical of the normal process of erosion. The drainage changes relate to Klaza river and Lonely creek."

Lithology and Structure

"The ... Plateau province is one of old metamorphic rocks, folded sedimentary rocks, volcanics, and intrusives.

Carmacks district lies well within the Plateau province and the basal rocks are metamorphosed sediments and possibly volcanics invaded, in places, by granite-gneiss and diorite-gneiss. It has been customary to include all of them in the Yukon group, but it is now proposed to exclude the granitic gneisses which are probably deformed intrusives. The Yukon strata and the deformed granitic rocks invading them are presumably of Precambrian and early Palaeozoic age. ...suffered folding and have been invaded

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by a succession of igneous rocks apparently contemporaneous with the Coast Range intrusives. These include a wide range of types varying from basic to acid, but granodiorite and granitic types prevail.

The period of igneous invasion was followed by one of erosion which exposed the intrusives. Erosion was interrupted in the early part of the Tertiary by the accumulation of clastic sediments and the extrusion of the Carmacks volcanics. In part contemporaneously with these volcanics, but probably in the main at a somewhat later date, numerous dykes and small intrusive bodies invaded the southwest part of the district. The clastics and volcanics have been faulted and warped and they have been removed to a great extent by erosion."

Yukon group: "Metamorphic rocks of the Yukon group..... consist of crystalline rocks of sedimentary and volcanic origins. The great majority of them are schistose and gneissic. They include rocks that are probably Precambrian and others that are almost certainly of later age, but no evidence has been found that permits their separation into divisions of definitely different ages..... Their structure shows a prevailing dip to the northeast in all the areas north of Klaza river and Rowlinson creek and from this it appears that the base of these strata occurs in the areas south of these streams where the strikes trend northeast."

"On the northeast side of Lonely creek the rocks are coarsely crystalline and massive, containing among them banded gneiss of hornblende and feldspar. These features are also true of the areas adjacent to Nansen and Victoria creeks where granitic rocks have intruded them. Along the contacts here much of the schist appears to have been partly assimilated by the intrusive, with marked introduction of pink feldspar and coarsening of grain size in the schists along the contact. "

"The rocks of the Yukon group are everywhere intensely recrystallized and, except in the case of the limestones and quartzites, schistose or gneissoid. Their original characters have been completely masked and only the limestones and quartzites show distinctly the original bedding planes. Schistosity has been developed in many places along more than one plane so that the rocks break into splintery fragments rather than plates.

Though local irregularities are common, yet in general two main trends of folding are exhibited, one northwest and the other approximately north 60 degrees east. The northeast trend is predominant south of Klaza river and Rowlinson creek and the dips are seldom over 30 degrees, though steep dips were noted in a few localities. Contacts with granite in this part of the district mainly trend northeast, parallel to the strata, whereas elsewhere they predominatingly trend northwest. The reason for the northeasterly trends in the southwest are not clearly understood, but may be due to a folding older than that which predominates over the rest of the district."

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"The Mount Nansen group is the next oldest formation found in contact with (the Yukon group). The Mount Nansen volcanics in several places cap the tops of hills whose lower parts are formed of strata of the Yukon group lying in structures unrelated to those of the Mount Nansen group and from this, though no exposed contact has been found, it is concluded that the Mount Nansen group rests unconformably on the Yukon group. The group is intruded by granite-gneisses and all the later intrusives."

The fact that the strata south of Klaza river and Rowlinson creek appear to be the lowest and show a general northeast structural trend such as is almost lacking in the case of the strata of the other areas of the Yukon group and of the younger formations suggests that these rocks are the oldest part of the Yukon group and may be Precambrian."

Mount Nansen group: "The areas of the volcanic group in the Dawson range form a ... somewhat broken and irregular belt. They constitute most of the highest peaks, thus illustrating their resistance to erosion..... The prevailing colour (of the rocks) is greenish grey to black..... They have a speckled appearance, due to the presence of light-coloured individuals of feldspar thickly scattered through a dark groundmass. They weather to shades of grey or greenish grey, lighter than those of fresh surfaces. They break into angular fragments with sharp edges and relatively smooth faces, and produce a talus of fragments 6 inches to 1 foot long. Peaks composed of these rocks.... have relatively flat tops and uniformly steep slopes. In many instances they form small conical points projecting above talus slopes exhibiting terrace-like forms."

"Rock ... occurs in the vicinity of mount Nansen, but here in addition occur dacites, dacite breccias and agglomerates of purplish colour and having fragments up to 12 inches long. Veinlets of epidote and of carbonate are common features..... In the Dawson range and to the southwest the rocks are prevailingly fresh in appearance and show no sign of regional metamorphism. In a number of places, where intruded by the granitic rocks, they have recrystallized to hornblende-rich material along the contacts. In a few places, as along Klaza river, contact metamorphism with production of epidote and sulphides was noted. Near contacts with granitic rocks in either of these belts..... the rocks of the Mount Nansen group have been sheared and recrystallized to green hornblende and chlorite schists.

In the Dawson range the dips are relatively low. The absence of distinguishable horizon markers makes the determination of faulting uncertain, but fractures with slickensiding, gouge, and veinlets are common features and show that the rocks have been subjected to a considerable amount of fracturing, though the magnitude of the movements is unknown. "

"In the Dawson range although the contact was not seen, yet in many places the position of the plane of contact could be closely determined and there remains no doubt that the comparatively flat-lying Mount Nansen group lies unconformably on upturned and eroded strata of the Yukon group."

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"At various places the rocks of the Mount Nansen group are intruded by the Mesozoic intrusive rocks. In the Dawson range several areas of the Mount Nansen group form tops of hills whose bases are largely or wholly composed of Mesozoic granitic rocks, and in nearly all cases the granitic rocks were observed to intrude the volcanics, to send apophyses into them, and in several places to have induced considerable metamorphism in them. The areas of volcanics are roof pendants, and their preservation is due to their ability, particularly in unglaciated areas, to resist erosion.

The Mount Nansen group is unconformably overlain by the Carmacks volcanics."

Mesozoic Intrusives: "A large part of the district is underlain by intrusives which by reason of their relationships and lithology may be correlated with the Coast Range intrusives. The great majority are thought to have been intruded at intervals during a single period of batholithic invasion. For purposes of mapping and description these intrusives have been classed as diorites, syenites, and granites. Each class includes a great variety of types."

"The large area of syenite near Victoria mountain is mainly composed of syenite types like those already described. They are traversed by bodies of dyke rocks, many of which are acid intrusives of Tertiary age. On Victoria mountain the syenite rocks are in contact with a large irregular body, or bodies of quartz diorite and hornblende porphyry, but the relationships between them are obscure and doubt remains as to which is the older, though the syenite is believed to be. The quartz diorite and hornblende porphyry are medium-grained, grey rocks in which hornblende and feldspar, and in some instances quartz, form the chief constituents visible to the unaided eye. The groundmass is fine or medium grained and is mainly composed of oligoclase with small quantities of hornblende, quartz, and orthoclase."

"The syenitic rocks intrude the Yukon group and the Mount Nansen group. Evidence of this was noted in many places in Dawson range, the contacts showing dykes of the syenites extending into these groups and xenoliths of the older rocks in various stages of recrystallization, commonly to hornblende-rich masses in the case of the volcanics."

"The small areas in the vicinity of Nansen and Victoria creeks are largely granite, and the same is true of the outcrops in the southwest corner of the district."

Carmacks volcanics: Carmacks volcanics lie in what appear to be down-warped or down-faulted areas. Some of the masses have great thickness and attain elevations suggesting that originally the volcanics covered practically the entire district.

The lavas are mainly andesites, but range in composition from basalts to dacites, trachytes, and rhyolites."

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"The attitudes of the flows are not everywhere determinable, but in many localities dips of 10 to 20 degrees occur. In a number of places the contacts with older rocks are faults and in places faults cross them in northwest, northeast, and approximately north directions. All these faults appear to be normal faults. The three larger areas southwest of Lewes river form broad, irregular, synclinal basins whose longest axes trend east and west. These structures are better described as warps than folds. Most of the smaller areas are either remnants capping older rocks or down-faulted bodies, and their longer dimensions commonly show a northwest trend."

Tertiary Acid intrusives: "Many small bodies of acid intrusives occur in the Dawson range and in the country along its flanks. Most of them are medium or fine-grained, acid rocks, largely quartz porphyry, fine-grained granite porphyry or granophyre, with some rhyolite."

"The rhyolitic varieties along the east part of Nansen creek and elsewhere resemble cherts, but in places have distinct quartz and feldspar phenocrysts. They pass gradually into the more coarsely textured granite porphyries."

ECONOMIC GEOLOGY

Placer: "The most important placer area yet discovered is that of Nansen and Victoria creeks. It was examined by Cairnes in 1914 and much of the following information is from his report. Placer gold is believed to have been first found on Nansen creek near the mouth of Discovery creek by Henry S. Back, in July 1899."

"The gold in the lower placers on Nansen creek is largely fine, but in the lower parts of some of the tributaries a fair proportion of coarse, rounded gold has been reported. In the upper parts of the tributaries it is reported to be fine, rough, or, occasionally, wiry. Galena, barite, pyrite, and zinc blende are reported as commonly caught in the sluice-boxes.

Practically all the gold has been obtained from the upper half of Nansen creek, the tributaries from the east entering this part of Nansen creek, and Back creek, which heads with these tributaries and enters Victoria creek from the west. The courses of these streams head in or close to areas of Tertiary acid intrusives which in many places carry disseminated pyrite. These features strongly suggest that the source of the gold is associated with the acid intrusives."

Lode: "Little indication of mineral deposits was observed in the large areas of Yukon group rocks, but these rocks should prove to be as good hosts for mineral deposits as any other formation in the district, especially where they are in contact with later intrusives ..... The areas of the Mount Nansen group must also be judged with reference to the proximity of intrusives, but as in this district they are everywhere close to intrusives they are regarded as promising prospecting ground."

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"The best part of the district is believed to be the Dawson range, from the neighbourhood of Victoria and Nansen creeks across to Stoddart creek and northwest to Hayes creek, the head of Big creek, and beyond the district. Along this belt there are numerous contacts between the intrusives and older rocks, the intrusives show the greatest variety of differentiates, and the larger granitic bodies are mainly granodiorite with some quartz diorite. Along this belt the gold placers of Nansen, Victoria, Seymour, and Hayes creeks are distributed and the belt is considered to continue westward where it contains those of Selwyn river, and Britannia and other creeks."

PHOTOGEOLOGICAL CONSIDERATIONS

As rock units are well distinguished on Bostocks map, aerial photographs have nothing to add (most of the contacts go through unexposed areas).

Foliation is evident in the Yukon series, conforming to the mapped northeasterly trends.

The prime new data is on faults and shears. These are profuse and complex. The complexity results from several orogenies and periods of intrusion, in which folding would be primarily accompanied by wrench faulting, and intrusion by normal faulting.

Fortunately, such disorderliness is conducive to the formation of channelways for mineralisation. Bostock, while not dating mineralisation, suggests it is late in the geological history of the area, when many faults were presumably already in existence. No theoretically preferable direction for mineralisation is suggested, therefore, and in prospecting, accumulating data from the field must guide further work.

The present study, therefore, may be regarded best as an addition to basic structural data.

Respectfully submitted,

W. Walker,
F.G.A.C.

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LEGEND

MODERN

Recent alluvium, glacial drift, volcanic ash.

TERTIARY

CENOZOIC

13 — Quartz porphyry, granite porphyry rhyolite

12 — CARMACKS VOLCANICS: Basalt, andesite, dacite and trachyte flows, breccias and tuffs

JURASSIC OR LATER

10 — Granite, granodiorite, and allied rock types.

9 — Syenite, monzonite, and allied rock types.

MESOZOIC

7 — MOUNT NANSEN GROUP: Basalt, andesite and dacite flows, breccias and tuffs

TRIASSIC

2 — YUKON GROUP: Limestone

1 — YUKON GROUP: Mica-quartz schist; some chlorite schist, graphite schist, quartzite serpentine, gneiss, limestone

PRECAMBRIAN OR LATER

Areas in which dykes and irregular bodies of tertiary quartz porphyry, granite porphyry and rhyolite are numerous

SYMBOLS

Contact
Foliation
Faults
Prospects

Map by des o'hanrassy

PROPERTY LOCATION MAP

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GEOLOGY

VICTORIA MT - MT NANSEN AREA.

by

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FEET

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