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Short report on the Placer Gold Deposits of Finmarken, northern Norway, with particular refering to the Helligdalen Creek Deposit.

By Edwin C. Bloomfield.

Introduction.

The investigation carried out by me during the month of September this year was primarily to examine the gold placer property of Mr. Thesen at Helligdalen, secondly to form an opinion as to the prospects in general, and thirdly to enquire into the means whereby prospecting of the region could be carried out under foreign control - whether by concession or otherwise.

The scope of the investigations was limited by the funds placed at my disposal and in a minor degree to the approach of the winter. Nevertheless sufficient information was gathered to enable me to say with conviction that:

1. Mr. Thesen's property shows sufficient promise to warrant thorough prospecting in conjunction with neighbouring places.
2. The potentialities of the region as gold producer are immense.
3. The friendly attitude of the Norwegian Authorities and information secured from them and other sources indicate their strong desire to meet foreign - and especially British - enterprise in Finmarken in every way possible, particularly by the granting of a number of large claims at a nominal fee per claim.

The granting of a concession covering the whole goldfield although entirely against the practise and tradition of the Country, could, in my opinion, be secured - although probably with some difficulty.

Location and Communications.

The centre of the gold region is the Lapp settlement of Karasjok - consisting in winter of about 1000 inhabitants.

It lies on a broad alluvial flat of the river Karasjok in Latitude of 69.15 N Longitude 25.33 E at an elevation of 130 metres above sea level.

An excellent daily service of mail steamers runs throughout the year from Bergen to Kirkenes calling at Hammerfest and Honningsvaag.

At present the route from Honningsvaag to Karasjok is by small steamer to Hamnbugt at the head of Porsanger fjord, then by motorcar over a new road to a point 14 kilometres from Karasjok - which distance has at present to be traversed on foot. By this time next year it is expected that the road will be extended to Karasjok, - and also that a new road being made from Hamnbugt to

Hammerfest will be completed. It will then be possible to reach Karasjok from Hammerfest by motorcar in one day.

From Karasjok transport is by rivercanoe with outboard motor. Up to a maximum load of one ton per canoe might be transported up river, say to Hellidalen, depending on waterconditions. Heavy machinery could best be transported over the ice in winter.

Topography and geology.

The accompanying photographs show the topographic features of the region. The country is peneplain 300 to 500 metres above sea level sloping gradually Eastwards to the Tana river and is covered with moraine material. Rock outcrops are visible on the dome shaped heights projecting above the peneplain and the more recent valleys.

The predominant rocks of the region are granite, gneiss, quartzite, feld-spatic sandstones and basic rocks consisting of gabbros, clivenite, amphibolite and amphibolitic shists.

Streams grades are generally flat. The valleys become gradually shallower towards their sources and finally vanish in the broad hollows of the peneplain.

Practically all the valleys contain gold bearing gravels both in the creek bottoms and on terraces. The principal valleys are those of the Tana, Karasjok, Anarjok and their tributaries.

Climate and vegetation.

The climate at Karasjok, the centre of the region, is not so severe, as one would judge from the high latitude - largely due to the influence of the Gulf Stream. The average temperature for the year is + 2,8° C.

January, the coldest month, averages + 15,8° C.

While July, the warmest " " + 12,5° C.

Rainfall averages 438 m.m. per annum.

According to mr. Thesen, who has spent two seasons there, there are no permanently frozen gravels in the region, which statement I found no evidence to doubt.

An average dredging season can be reckoned at 150 days - although mr. Thesen is of the opinion, that 200 days might be managed under certain conditions. The lower slopes and valley bottoms adjacent to the streams are usually swampy and covered by thick moss and scrub. Trees consisting of stunted birch and pines grow everywhere except at the highest elevations.

Timber and fuel.

There is sufficient pine in the region for all purposes except fuel of maximum size of about 1 foot diameter at the base and fifty feet in height. It can be cut by the gold diggers on the same terms as the natives, that is about 1 sh. o d. stumppage.

Birchwood can be cut for fuel free. It is in sufficient quantity for all prospecting operations and for all likely domestic purposes.

Power.

Wood fuel is not sufficient in quantity for large scale operations using steam power. Water power is available in quantity but usually at comparatively low head. Crude oil should in some cases be considered.

The Helligdalen Property.

This is a creek placer situated at Latitude $68^{\circ} 48' N.$, Longitude $25^{\circ} 33' E.$ It is an old bed of the river Anarjok and lies about 20 metres above the level of the present stream. Its exploitable length to where it joins the broad swampy flats of the river Hugstelven is some 5 kilometres, and its width from 100 to 200 metres. Most of the creek bottom is swamp and marsh but some places dry gravel is exposed. At such places Mr. Thesen has sunk pits until water level is reached, or the presence of large boulders or necessity for supporting the sides of the pit made further progress difficult and expensive.

Some 18 pits have been sunk by him in the creek bottom at irregular intervals over a length of about 2 kilometres. The pits vary from 1 to 4 metres in depth with an average depth of 2 metres.

None of the pits with exception of two on this side of the valley encountered bedrock. The bedrock seen on the sides of the creek is diorite and amphibolite shists and is hard.

The gravel sometimes alternating with sandy patches lies immediately beneath a thin covering of moss and surface soil. One third consists of boulders from 8 inches to 2 feet in size with an occasional boulder exceeding this.

The boulders are rounded or subangular and consists of a variety of rocks.

All the material exposed in the pits was sampled by me every half meter in depth. The results of this work indicates an average tenor for the material exposed in the pits to date to approximately 30 cents gold per cubic yard.

Considering the superficial nature of the pitting this is regarded as highly encouraging. There is certain to be a concentration of gold on bedrock.

No particular concentration of gold was noticed in the pits - except that the richer samples were obtained where boulders were numerous and big - while as a rule the looser sandy material gave a low results. There is a large variation in the average of various pits indicating a spotty character. The richest gravel was disclosed by pits "K" and "N", the latter averaging \$ 1,30 gold per cubic yard. The largest colour from this sample weighed 19,5 milligrams.

The gold is in general coarse, platy, bright and is of exceptional fineness.

Occasionally a small colour of what appeared to be platinum was observed in the pan along with the gold.

Owing to lack of equipment for sinking through waterlogged ground neither the creek bottom has been reached nor had any serious attempt been made to prospect the extensive alluvials, mostly covered by water, situated at the Northern end of the property. Here I panned gold at several points within an area of about a square kilometre.

The possibility of the region.

The limited amount of prospecting work carried out at Helligdalen by Mr. Thesen gives an indication of the possibilities of the region as a whole. This particular deposit was found by him largely by the result of study of the topographic map. It is probably only one of many which could be discovered by scientific prospecting.

About one kilometre West of Helligdalen a similar "dry" valley exists, formerly occupied by the Anarjok river. This can be traced across the Caskimjok for many kilometres in a Northerly direction. Its gravels, and those of the broad swampy floor of the Caskimjok valley contain gold. The Caskimjok above Helligdalen is a sluggish stream of about 5 cubicmetres per second, meandering over a valley about one kilometre in width. It appears an ideal dredging proposition.

Further evidence of the widespread occurrence of gold in the region was obtained by panning creek and terrace gravels of the rivers Anarjok, Fosselven and Karasjok.

Terrace gravels up to 10 metres or so above river level occupy the Anarjok valley South of Helligdalen over an area of many kilometres. Gravel was panned at various points up to a distance of about 300 metres from the river, and gold was found in every pan except one.

Gold was found in the gravels of this river between this place and its junction with the Karasjok.

The gravels of the Fosselven were tested with positive results up to a point about 8 kilometres from its junction with the Anarjok. At this place eleven coarse colours were obtained from a pan of gravel from the creek bed, and a pan from a terrace twenty feet above the stream gave two medium colours.

The gravels of the Karasjok river were tested at intervals up to the confluence of the Jesjok, both in the river bed and on terraces. In the majority of cases gold was present. The Karasjok river is a slow moving stream up to 150 metres in width, and in places up to 10 metres in depth. It is flanked by extensive alluvial flats and terraces, the width of the alluvials in places exceeding a kilometre.

The Valley of the Karasjok offers very great possibilities, if testing of the gravels proved its suitability for dredging.

There is thus no doubt of the widespread occurrence of gold in the region.

Why it has not received serious attention, I attribute firstly to its inaccessibility. This is being overcome by the construction of roads. Secondly the indifference of the native inhabitants, the Lapps, who live well by their reindeer. Thirdly, the climate, which although cannot be called pleasant, and the fourth and probably principal reason is the inability of individuals with limited capital to test the deposits to bedrock and to exploit them profitably. At the present time there are only three or four claimholders in the whole region, but no serious work has been done by them for this reason.

Furthermore according to Mr. Thesen no one with placer experience has prospected the field, and no engineer except he and myself have visited the region professionally since Dr. Tellef Dahl made a survey for the Government in 1866.

Prospecting the deposits.

A thorough geological study of the region should accompany any prospecting undertaken. Proving the value of the placers will be expensive and can only be done by means of heavy power drills. Winter pitting could in some places be done with advantage.

Labour.

The lapps in the region are sufficient in number to supply labour requirements, but it is unlikely that they would work at first for long periods. Therefore for any large scale operations it would be necessary to import men from the Tromsø district where there are at present many unemployed. Wages in the Karasjok district are kr. 1,- per hour, so that 10 sh. per day is a safe figure.

Mining laws.

The usual mining laws do not apply to the placer deposits in Finmarken. Instead there are Regulations, which are Royal Resolutions. Copy in Norwegian and English attached to this report. These regulations are elastic, the size of claims being largely within the jurisdiction of the Mine Inspector and the Director of the Department. The size of claim usually given at present is one kilometre in length for the whole width of the deposit.

To a company undertaking serious work in this field the Department is inclined to give claims two or even three kilometres in length, and to permit acquisition of many claims. Other points worth notice are that the cost per claim is kr. 100,- - £ 5 -, which is supposed to cover survey fee. It is necessary to do 200 man-days work per claim per annum, that is, an expenditure of £ 100 per claim - Labour kr. 10,- per day -, but this sum could, by arrangement, be spent instead as an additional sum on other claim or claims.

Royalty amounts to two per cent on the gold won.

Foreign control.

Any company formed to prospect and work the deposits must be a Norwegian Company, the Board of which must have Norwegian subjects in the majority.

Foreigners are allowed to hold more capital than 20 % of the capital provided permission is obtained from the Ministry of the Interior. Such permission I was assured would be readily given for the business contemplated enabling foreigners to hold almost, if not all, the share capital.

Taxes.

The principal tax is income tax of 6 %. Any undistributed surplus at the end of one year is taxed at further 8 %. Shareholders are supposed to pay tax amounting to approximately 20 % on what they receive. Other taxes of less importance are the property tax of about half of one per cent per annum, and Incident and sick Insurance of about seven-tenths of one per cent on wages paid.

Conclusion.

I know of no other goldfield in any part of the world where greater promise of success awaits organized enterprise.

Sign. E.C. Bloomfield.

London, October 10th 1932.