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P R E L I M I N A R Y (QUALIFICATION)

T E C H N I C A L R E P O R T

on

QUEBEC LABRADOR DEVELOPMENT COMPANY ~~LIMITED~~

(Ungava Concession)

District of Ungava, Province of Quebec.

C A N A D A.

N.T.S 24-P et 24-C

BY: L. Germain, P. Eng.
REPORT NO.- M-18
September 12, 1947

To the Directors,
Quebec Labrador Development Company Limited,
100 Adelaide St. West,
Toronto, Ont.

Sirs:

The present report is written specifically and exclusively for purposes of qualification with the Ontario Securities Commission.

To our knowledge, no work has yet been done at the property and, no examination was made of the latter for the present purpose. Consequently, most of the information that follows is based almost entirely on reports of field work carried out during the latter part of the last century by R. Bell and A. P. Low. The region is very remote and has been almost inaccessible until the advent of airplane transportation. The summer season is very short or almost non-existent inhibiting progress in the geological mapping of this vast region. Considering the difficulties of access at the time, the shortness of the summer season and the size of the territory covered, the writer has always wondered at the voluminous mass of data brought back by Low from widely scattered points in four short seasons of field work. Our present knowledge of the geology of the interior of this vast peninsula is almost exclusively the result of Low's reconnaissance work in 1885 and subsequent years and, more particularly, during the seasons of 1892 to 1895.

His work definitely established one very significant point having critical importance in connection with the tract of land recently acquired by your company from the Quebec Government:

> Some data have been collected and published indicating clearly that the geological formations which are presently yielded rich iron deposits on HOLLINGER NORTH SHORE and LABRADOR MINING extend to and across your own ground where, in addition, they have been found to contain sufficient indications of iron ore to justify the expectancy of developing similar deposits thereon.

The data reproduced in this report from Low's accounts will show that this is not mere speculation on vague information but constitute, in our opinion, ample justification for the execution of any sane program of development in terms of continental economy.

P R O P E R T Y

The property consists of a rectangular block of ground having an area of 1,024 square miles obtained from the Government of the Province of Quebec on September 2, 1947 as a mining concession more particularly described as follows:

> "To be bounded on the South by a line drawn "East and West through the junction of the "Kaniapiskan and the Swampy Rivers. This "line to commence at the South end of Lake "Wapanikskan and proceed in a westerly direc-"tion for 16 miles and to pass through the "junction of the Kaniapiskan and the Swampy "Rivers."

> "To be bounded on the East by a line drawn "from the South end of Lake Wapanikskan in "a direction North 17° W. for a distance "of 64 miles or till this line intersects the "Koksoak River."

> "To be bounded on the North by a line drawn from the intersection of the Easterly bound-"ary and the Koksoak River in a westerly "direction for 16 miles and parallel to the "Southern boundary."

"To be bounded on the West by a line drawn
"from the western end of the South boundary
"to the westerly end of the North boundary
"and parallel to the East boundary."

"All bearings are true bearings."

LOCATION AND ACCESSIBILITY

On a geographical map, the property will be found located some 75 miles to the South of Ungava Bay with the northeast corner located at a point only 5 miles below the junction of the Koksoak and Larch Rivers and, about 100 miles from the mouth of the former. It is bounded by the North parallel of latitude 56°51' and 57°44' and, roughly, by longitudes 68°55' and 69°50 West.

The property is not easily accessible at the present time except with longe range aircrafts or by the sea during the summer months. In the latter case, transportation would have to be organized from seaboard inland along the Koksoak and Kaniapiskan Rivers for a distance of over 100 miles depending on the location of camp sites at the property. The Kaniapiskan River traverses the property from South to North and should afford a convenient means of transportation locally as it flows along the long dimension of the property and roughly about the middle, in an east-west direction.

Developments at the Holliger North Shore and Labrador Exploration which are located only some 100 miles to the southeast justify the expectation that more convenient means of access will be available within the next few years from Sept-Iles on the North Shore of the St.Lawrence River whence traffic into the interior of the Ungava peninsula is converging at the present time. Preliminary surveys for the construction of a railway from Sept-Iles to the Hollinger property have been completed and it is expected that as soon as sufficient ore has been indicated construction of the line will get under way. The main line is planned to be about 360 miles and with its terminus only about 100 miles from your peoperty should greatly facilitate access to your own ground with a corresponding reduction in transportation costs.

PHYSIOGRAPHY

The broader physiographic features of the Ungava territory belong to a unit which has been termed the Quebec-Labrador peninsula which, in turn, represents the eastern part of the Canadian or Laurentian Shield. This is a major physiographic unit of some 2,000,000 square miles that embraces practically the whole of northeast Canada, with extensions into the United States represented by the Superior highland of Wisconsin, Michigan, Minnesota and the Adirondacks of New York.

The present surface features are the result of Pleistocene glaciation on a bedrock surface of varying degrees of hardness or resistance to erosion depending on the geological formations affected in the process. Generally, the Laurentian Shield, is characterized by glacially smoothed, low, rocky hills surrounded by lower lands variously distinguished by morainal deposits of different kinds left by retreating glaciers, by swamps and lake-filled depressions that are the result of the glacially disorganized drainage, and in certain parts of the region, by clay and sand plains resulting from the deposition of material in large glacial lakes.

The region is plateau-like in broad outline, with a general level below 2,500 feet but, very rugged in detail. Low(1) reports that sharp, rocky hills were observed to rise to as much as 800 feet above the general level of the ground on both sides of the Kaniapiskan River on the property. Some of the hills peaks where they consist of stratified Cambrian rocks. On the other hand, where the underlying bedrock is Laurentian gneiss or granite, the hills, though often high and with perpendicular sides towards the river-valley, always have rounded tops with long gently-curved outlines. A number of terraces were observed on the sides of the hills facing the Kaniapiskan River to an elevation of 200 feet above water level.

The Kaniapaskan River is, from all accounts, a mighty river. Its source is Kaniapiskan Lake which is located roughly at the center of the Ungava peninsula and about half-way between the St.Lawrence River and Ungava Bay to the south of Hudson Straits. The river is more than 400 miles in length and, follows a north-northwesterly course across the concession, from its junction with the Swampy Bay River at the south boundary of the property to its confluence with the Larch River where they form the Koksoak River which runs to north-east and empties into Ungava Bay.

Directly across the property, the river flows in a series of alternating broad sweeps and narrow, rock-bound channels.

It is in places as much as one mile wide whereas, in the narrow sections, the river has cut through limestone strata which also show evidence of heavy fualting. Three series of fall have been reported by Low: (a) at Pyrite Chute, where the river falls 30 feet in a distance of ½ mile; (b) at Limestone Falls, where a total drop of 60 feet was observed, and (c) at Manitou Gorge, where the river rushes through 5 miles of a narrow valley with walls 50 to 300 feet high.

From the foregoing, it is obvious that a very large reserve of hydroelectric power exists directly on the property to serve the power requirements of any mine or industry that may eventually be developed locally.

GENERAL GEOLOGY

Rock formations belonging to the Cambrian period have been mapped by Low along the Kaniapiskan River, from the mouth of Larch River to the south end of Cambrian Lake. These rocks rest unconformably upon the Laurentian and Huronian and, consist of beds of arkose, sandstone, chert, limestone, dolomite, felsitic shale, argillite and argillaceous shale, together with the sedimentary formations are beds of iron formation including jasper-hematite-magnetite beds and cherty iron carbonate. The general strike of the band is north-northwest with dips to the northeast ranging from 10 degrees to 80 degrees. The band has been traced along the Larch and Koksoak Rivers and is roughly estimated to be about 35 miles in width. Low has ascribed a probable thickness of some 2,500 feet to the succession of these sedimentary rocks along the Koksoak River.

Similar rocks were mapped by Low along the projection of the line of strike, on the Ashuanipi branch of the Hamilton River. More recently, rcks of this type have been mapped about 75 miles yet farther south on the Quebec Labrador boundary (Gill, Bannerman and Tolman, 1937, pp.567-586) where they were given the local name of Wapassakatoo series. If these rocks extend continuously between the three areas, a total length of approximately 400 miles is indicated. Four members were distinguished in the Wapassakatoo series: mica schists and gneisses, iron-bearing formation, schistose grit and white quartzite, the mica schists and gneisses being thin-bedded, strongly schistose rocks locally interbedded with iron-rich bands indistinguishable from the overlying iron formation. The formation is as much as 1,000 feet thick.

There are indications that this band of Protorozoic-like rocks extends northward beyond the property. Metamorphosed sediments have been observed on the Gyrfalcon islands in Leak Bay, seventy-five miles due North, and more extensively along Payne River, still another hundred miles northward. Low reports the existence of gneiss and schist of sedimentary origin at several points along the coast between Payne River and Cape Hopes Advance, a further distance of seventy-five miles.

Faulting has greatly disturbed these rocks. A number of parallel step-faults, with heavy throws, has caused a series of repetitions of the various members of the formation and, Low reports that on the Koksoak River, below the junction of the Stillwater Rivers, the hills on the north side of the stream show sixteen of these faults in a distance of twenty miles.

LOCAL GEOLOGY

Low gives the following section as a typical illustration of the development of Cambrian rocks along the Koksoak River, immediately to the North of the property, the members being listed in descending order:-

1.-Rusty-weathering, black, micaceous shales.	600 feet
2.-Dark-grey, ferruginous cherts.	200 feet
3.-Dark-grey, ferruginous cherts, together with beds of jasper & magnetite.	500 feet
4.-Fine-grained, dark-grey, ferruginous cherts somewhat calcareous & blotched with siderite.	150 feet
5.-Light-pink, very compact, brecciated limestone, often very siliceous.	.20 feet
6.-Light-green siliceous shales	30 feet
7.-Black, carbonaceous, graphite chales . . .	100 feet
8.-Massice, cherty, dark-blue dolomite. . . .	.10 feet
9.-Pearly-green shales, with cherty dolomite beds, showing ripple marks.	.40 feet
10.-Coarse, grey sandstone	3 feet
11.-Greenish-grey, calcareous shale, with occasional bands(6" to 15")of fine-grained, dark-blue dolomite, weathering yellow	.30 feet
12.-Fragmental, violet-pink, calcareous chert.	200 feet
13.-Red, calcareous sand-rock.	200 feet
14.-Medium-grained, red sandstone & thin beds of red felsitic shales	.10 feet
15.-Bands of red grey sandstone, separed by beds felsitic shales.	425 feet
TOTAL.....................................	2,518 feet

On the property itself, along the Kaniapiskan River, the following exposures have been observed from south to North:-

An enire hill of dark-blue, cherty, ferruginous limestone holding large patches of siderite throughout with a few bands of jasper, these rocks being continuously exposed for a mile along the river, a mile below Swampy Bay River. Then follow two miles of greatly disturbed, rusty-weathering black shales and argillaceous limestones. The next 13 miles show only occasional exposures of shales & limestone rising from beneath the drift with the shales gradually dimishing in extent down-stream. Almost constant exposures of limestone occur along the following 12 miles to the Pyrite Chute. Low reports that this limestone strikingly resembles that found at Mistassini Lake and along the east coast of Hudson Bay, being generally light-blue in colour, very siliceous, exceedingly fine in texture where free from grains of quartz and, breaking into sharp angular fragments. Sharp folds and faults have broken many of the beds of limestone into angular fragments cemented with calcareous matter into a breccia. The whole has again been fractured and is now penetrated with quartz veins running in all directions.

Black shales outcrop again at the Pyrite Chute and, include a few bed of fine-grained, black limestone, greatly contorted into small domes dipping steeply in all directions. Below the chute, low hills with rusly cligfs have been interpreted to consist of shale.

Light-blue magnesian limestone are again seen on the islands above Limestone Fall. The rock is of a light-blue colour, comewhat siliceous and brecciated by numerous small veins of quartz that cut it in all directions with a few thin beds of perly-grey, calcareous shale interbedded with it.

No rock outcrops were observed along the river between Limestone Falls and Manitou Gorge where the river has cut a long, narrow channel out of the shales and Limestones. Large exposured of black shales striking N-75°-E. and dipping 50° were found at the heat of the Gorge and, were seen to continue down the east side for over a mile

As the junction with the Larch River is approached, the shales change from black to pearly-grey becoming somewhat siliceous and having interbedded thin bands of limestones which gradually become more numerous and thicker until they finally altogether displace the shales. The bands interbedded with the shales are very siliceous and some of them pass into quartzite. Some of these quartzite bands are white, others yellowish and, other again have a purple colour.

Four miles below the gorge, or a mile above the mouth of the Larch River, Low has observed a large exposure of light-blue, fine grained, siliceous limestone on the east bank of the Kaniapiskan River.

All the foregoing rock series are considered to belong to the Cambrian and, to have been deposited on the Archean granites and gneises after a long period of levelling down and removal of great masses of the older formations.

MINERAL DEPOSITS

Considering the present inaccessibility of the region and the hurried and sporatic exploration that has been possible unti now, the data brought out by Low and Bell obviously indicate that this vast territory might eventually play a deading role in the minerale economy of Canada if not of the whole North American Continent.

Positive indications of Immense iron deposits have been found at widely-scattered points in the Cambrian formation which is known to exist on the East Coast of the Hudson Bay, at Lake Mistassini and along the Koksoak and Hamilton Rivers. Already considerable information ha been published about the deposits found at the headwaters of the Hamilton River, along the Quebec Labrador boundary where limited development by Hollinger North Shore and Labrador Development have indicated more than 100,000,000 tons of iron ore assaying on the average about 50 to 60% in iron with very little deleterious ingredients.

This ore has been found in a band of Cambrian rocks which is over 50 miles wide and which extends for about 400 miles in the direction of the property where ample indications have been found that it may be of similar nature and that it may contain similar deposits.

A large number of quartz veins have also been observed by Low along the Kaniapiskan River directly on the property and, although no gold has been reported sufficient pyrite and galena has been observed in them to warrant exploration for precious metals. The more salient facts in this connection are as follows:

(a) A large exposure of bedded iron ore (a mixture of magnetite and hematite) a out 25 feet thick has

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been found two miles below Shale Chute on the Kaniapiskan River and, only some 8 miles south of the south boundary of the property;

(b) Another exposure occurs on the west bank of the river, 3½ miles down-stream, where a dark-grey, compact chert holds angular fragments of cherty limestone and siderite;

(c) On the same bank and half a mile lower down-stream, 50 feet of red silicious shale and jasper are overlain by 200 feet of jaspery magnetite;

(d) In the next half-mile, 400 feet of red jasper and magnetite are overlain by 50 feet of dark-grey, cherty rock containing masses of iron carbonate;

(e) A mile below Swampy Bay River and, directly on the property, there is an entire hill of dark-blue, cherty, ferruginous limestone holding large patches of siderite throughout;

(f) At the Pyrite Chute, again on the property, the black shales and limestones are all highly charged with pyrites, usually occurring as separate cubes but sometimes in large masses;

(g) At Manitou Gorge, pyrite in cubes is scattered in considerable quantities through the shales which are also cut by numerous small quartz veins, usually barren but sometimes carrying pyrites and, in one plece, a small quantity of galena has been observed;

C O N C L U S I O N S

From the foregoing description of iron and other ore occurences found by Low directly on the property, and, from the geological correlation which he has made with immense and rich deposits presently under active development by Hollinger North Shore and Labrador Development directly to the south, it is a foregone conclusion that your concession constitutes an extremely valuable tract of land warranting exploration with a very good chance of bringing to light similar iron deposits thereon.

According to Low, "the mode of occurence of these ores appears to be closely alanogous to that of the iron ores of Michigan and Wisconsin" and, depletion of the latter is presently giving great importance to the development of the Ungava deposits.

Respectfully submitted

(SIGNED)L. Germain, P. Eng.

R E F E R E N C E S: (1) A.P.Low - Summary on the Operations of the Geological Survey for the year 1895. Part L.