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Alton C. Bray

REPORT

ON CERTAIN PROPERTIES

BELONGING TO

MINES-METALLURGIES-KEBEC Inc.
(No Personal liability)

by

ALTON CHARLES BRAY, M. Sc.,

CONSULTING GEOLOGIST

March 17, 1965

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INTRODUCTION

The present report deals with the salient features of two large mining properties held by MINES-METALLURGIES-KEBEC Inc. containing important deposits of magnetite-bearing sediments. A copper prospect belonging to this Company is discussed briefly.

The writer was consulting geologist for Aconic Mining Corporation from April 1952 until March 1960, serving also as their resident manager at Natashquan during 1955 and 1956. He can therefore claim to have some knowledge of deposits of this type.

LOCATION AND AREAS OF PROPERTIES

MINES-METALLURGIES-KEBEC Inc. hold mining rights on more than 140 square miles of private and Crown lands in three main districts on the north shore of the river and Gulf of St. Lawrence. These districts are distributed along the coast from Sept-Iles to Harrington, both in the county of Duplessis, Province of Quebec, a distance of about 325 miles.

There is also a copper prospect in the numbered townships Nos. 1380 and 1381 on the upper Natashquan river, also in the county of Duplessis, Province of Quebec,

Areas of the properties discussed are: 1) Sept-Iles - Moisie, 11,632 acres; 2) Natashquan - Kegashka, 75,208 acres; and 3) Copper Prospect, 400 acres.

11,800 66,741

APPENDIX

Attached to the present report are the following appendices:

1) Map of part of the Province of Quebec, showing the location of the properties of MINES-METALLURGIES-KEBEC Inc.;

2) Plan showing Sept-Iles - Moisie property;

3) Plan showing Natashquan - Kegashka consolidated properties;

4) Plan showing Copper Prospect;

5) Map showing company industrial site in Natashquan wharf;

6) Annotated list of lots and claims owned by Company;

7) 1964 map of the department of National Resources related to main mining departments north of 50th parallel.

BIBLIOGRAPHY

In the preparation of the report, Company and personal records were consulted that are too numerous to be listed here.

The basic government publications, most of which have been long out of print, dealing with the magnetic sands of the North Shore include the following:

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5. McGerrigle, H.W. & Girard, H. SPECIAL REPORT ON THE IRON DEPOSITS OF THE PROVINCE OF QUEBEC, pp. 37-39, Quebec Dept. Mines, Min. Dep. Branch (1950);
6. Claveau, Jacques NORTH SHORE OF THE GULF OF ST. LAWRENCE FROM AGUANISH TO WASHICOUTAI BAY, SAGUENAY COUNTY, pp. 1-40 with map, Quebec Dept. Mines, Geol. Rept. 43 (1950).

SUMMARY AND CONCLUSIONS

MINES-METALLURGIES-KEBEC Inc. own mining properties on the north shore of the Gulf of St. Lawrence having a total area of about 140 square miles. They consist of large unconsolidated beach and terrace deposits containing an assemblage of heavy minerals including magnetite, ilmenite, hematite, garnet, zircon and monazite and are situated in the districts of Sept-Iles-Moisie, Natashquan-Kegashka and Harrington. The Company proposes to start mining and producing concentrates of these minerals in the near future.

The first two properties and a copper prospect on the upper Natashquan river are the subject of this report.

In the body of the present report, the origin and characteristics of the beach deposits are described and it is shown the major heavy-minerals concentrations were formed on beaches that were successively elevated to form terraces during the long time interval since the beginning of the recession of the Labrador glacier from this area. Older terraces, formed when the coast line was further north than it is now, have been wholly or partially eroded away so that their contents were removed and re-deposited elsewhere, or they were covered by wind-blown sand or persistent vegetation and are therefore preserved. Three classes of natural concentrates are recognized: 1) High grade black sands of current beaches and most recent terraces; 2) Lower grade unconsolidated deposits resulting from the erosion of the older terraces with occasional local concentration of richer material; 3) The partially concentrated deposits represented by past or present offshore beds of Champlain sediments.

The heavy minerals are discussed as to their characteristics, use in modern industry and possibilities with relation to their production by the Company.

The following section is devoted to a description of the Company's properties. It is shown that the beach and terrace deposits from property to property have many characteristics in common and it is inferred that the underlying beds of the finer-grained offshore deposits may also be similar.

No estimate of total mine reserve has been made as yet at any property belonging to this Company. At Moisie, detailed investigation has been limited to about 1 per cent of the area, at Natashquan about 27 per cent and at Kegashka less than 5 per cent. Nevertheless, large tonnages of established or potential reserves are known to exist and the decision of the Company to start active operations soon is thereby justified.

At Natashquan, systematic drilling of an area of 13.7 square miles to an average depth of 88.4 feet disclosed a mine reserve of 1,500,000,000 long tons averaging 3.73 per cent Fe. A selected area of 5.47 square miles, included in the above and centering on the present mine and plant installation, has an indicated reserve of 645,000,000 long tons to an average depth of 95 feet which averages 3.98 per cent Fe. Cost estimates, prepared by independent consultants to the former owners, showed that the larger area could be mined profitably for the magnetite alone. No estimate has yet been made of the percentage of the crude that will be recoverable as bulk heavy minerals but the writer believes that it may be as high as 5 to 6 per cent by weight. If this tentative estimate be correct, it should be pointed out that considerably lower percentages of heavy minerals have been extracted from detrital deposits with conspicuous success at other places.

Estimates of this scope have not yet been made at Kegashka or Moisie but the surface deposits so far tested indicate that some sections of the beach and terrace deposits are of higher tenor than those at Natashquan and volume for volume may well be richer.

At Kegashka, one very rich deposit has been shown, as a result of numerous tests, to contain as much as 80 to 95 per cent heavy minerals. Local concentrations elsewhere almost equal this figure.

Numerous data are available which show the relative proportions of the various heavy minerals in crude sands of various grades, but there is on record only one large scale and comprehensive investigation made for the express purpose of establishing the relative proportions of recoverable heavy minerals. This was performed by a group of laboratories on a large sample of tailings resulting from the extraction of magnetite concentrate from a medium-grade crude. The magnetite concentrate averaged 4 per cent recovery and had a tenor of 65 per cent Fe and 3.5 per cent TiO^2. The proportions of recoverable minerals were found to be: Magnetite 10, ilmenite 4, hematite 4, garnet 2, zircon 0.2. No attempt was made to recover the monazite. Put in another way, in this sample, which was representative of a mill run of several days' duration, 8 per cent of the crude entering the plant as mill feed emerged as heavy minerals including magnetite. More tests of this sort should be performed on material of both

higher and lower grade to establish whether or not this relationship is constant. If it is, the simple assumption may be made that roughly about equal weights of magnetite and the other heavy minerals may be produced from the beach and terrace deposits and perhaps from selected portions of the lower beds as well.

Plans are now being made by the Company: 1) To start operations at Kegashka on a limited scale in the near future; 2) To mine the more accessible high grade deposits and to extract a bulk heavy-minerals concentrate or a magnetite concentrate as circumstances require; 3) To employ for that purpose a 12-inch suction dredge with auxiliary floating barges equipped with concentrating equipment; 4) To install gravity and magnetic separators as minimum milling equipment; 5) To prepare for the market : a) high density magnetite as heavy-media; b) magnetite concentrate or bulk heavy-minerals concentrate as heavy aggregate; 6) To employ spiral and wet drum magnetic separators from the Natashquan plant as the nucleus of the floating separation plant; 7) To carry on with research dealing with the utilization and marketing of heavy minerals and heavy-minerals products.

Recommendations by the writer include limited exploration and drilling to establish a three to five year mine reserve at Kegashka, based on the initial production; further testing and research to determine optimum tenor and daily production, and standardization of equipment for maximum economy and efficiency.

An eventual increase in the size of the Company's operations should be prepared for by systematic exploration of the Kegashka and Moisie properties along the lines discussed or suggested in the body of the present report. This phase does not appear to be urgent and, in the case of Natashquan, may be deferred for several years.

Considering the various properties as a unit, it may be stated that large tonnages of heavy minerals are present in the established reserves and potential resources on the Company's holdings. In the opinion of the writer, the Company is fully justified in their decision to commence active operations in the near future.

GENERAL GEOLOGICAL FEATURES

The rocky North Shore is characterized here and there by beaches with unusual amounts of black sand containing magnetite. Under the magnifying glass, samples show the presence of ilmenite, hematite, almandine garnets, as well as smaller amounts of other heavy minerals such as zircon. Somewhat larger grains of lighter minerals occur in association with the magnetite, including pyroxene, hornblende, feldspar and quartz. The proportions vary from one locality to the next but magnetite is always present so that this mineral serves as a useful and easily recognized marker of heavy mineral accumulations.

Behind such beaches occur frequently one or more terraces of varying height with seaward-facing bluffs which expose cross-sections of the material of which the terraces are composed. They are well-stratified beds of medium - to rather coarse-grained sand which may contain groups of lenticular bodies of black sand, of similar, if not identical, physical characteristics to those forming below them near tide level. Cross-bedding and other features indicate that they also are beaches and that they were elevated after formation to their present level. In places, there is evidence of several such periods of uplift, each resulting in a line of terraces with the shore line receding to the south.

Since they are composed of unconsolidated material, such terraces are vulnerable to erosion unless continually protected by a mantle of vegetation. If exposed, however, the older terraces will tend in time to be obliterated by wind, rain and frost and much of their material scattered and re-deposited elsewhere, or the terrace may be covered by wind-blown sand. Traces of old terraces have been observed by the writer in the Natashquan area. They occur as abrupt, linear or gently-curved, elevations in open country, or bordering one side of a bend in a river or stream, or as cross-sections exposed on river bluffs of the rivers that have incised them, one or more miles north of the lower part of the Natashquan river. Accumulations of black sand also occur on bars and near eddies of southward-flowing rivers and streams.

The primal source of the heavy minerals is the rocks of the interior, some of them rich in iron and titanium minerals, which were disintegrated by glaciation and other agents of erosion. The detritus was carried south by rivers fed from the melting glacier and underwent rough sorting as to size and specific gravity during its journey. When it reached the shore of the post-Glacial Champlain sea, then occupying the whole of the St. Lawrence valley and isolated from the Atlantic ocean by an ice barrier across what is now the lower gulf, it was dropped to form beach, bar, tidal flat, delta and offshore deposits. In general, the coarser sands were deposited at or near the shore line, the fine material further out.

Concentration, dispersion and re-concentration took place many times during the river journey from their parent rocks to the sea, but it was at this destination that wave, current and tidal action acted further to separate heavy from light minerals. This separation was most effective on the beaches between points slightly above spring tide and a few feet below neap tide levels and here the richest concentrations took place.

When the Labrador glacier covered the land to a depth estimated at 12,000 feet, the surface subsided several hundred feet below its present level. Withdrawal of the ice was followed by a series of uplifts which progressively shifted the shore line to the south, leaving behind the terraces previously mentioned. The ice barrier which closed the lower gulf was breached, the Champlain sea drained away and the St. Lawrence river resumed its ancient course and once again flowed without interruption to the Atlantic.

The maximum thickness of the Champlain sedimentary series on the North Shore is unknown but elsewhere it has been recorded to be as much as 650 feet. On the lower Natashquan river, drilling (wash-boring) was carried as deep as 210 feet without encountering bed rock.

In the Natashquan area, the stratigraphic sequence seems to be as follows, starting with the lowest and oldest rocks:

1) Bed rock - At the first falls of the Natashquan river, it is red, gneissic, microperthite granite of pre-Cambrian age.

2) Basal Clay - Uncertain as to whether this is Pleistocene Boulder Clay or the lowest member of the Champlain series.

3) Argillaceous Sands - Very fine sands containing concentrations of black minerals (magnetite and ilmenite) as numerous closely-spaced laminae and associated with narrow seams of clay which tend to be less common toward the top of the beds. Well stratified. Offshore deposits.

4) Lavender Sands - Not present everywhere. Fine, stratified with sparse or no clay. Black laminae especially near base.

5) Gravels - Most commonly medium to fine and interbedded with gravel-free sand beds of medium texture. Least mineralization of beds 3 to 6.

6) Beach Sands - Stratified, with regular and cross-bedding. Medium to coarse-grained with variable black-mineral bands and local strongly-mineralized lenses of heavy concentrates.

THE HEAVY MINERALS

MINES-METALLURGIES-KEBEC Inc. intends to develop its properties so as to produce all heavy minerals over 4.0 specific gravity, including magnetite, for a broad market rather than to serve as sources of supply to the iron and steel industry. This is an entirely new approach to the problem as to what to do with the magnetite-bearing, unconsolidated material occurring in such abundance at a few favored localities on the North Shore.

It is therefore appropriate to list here the principal minerals reported in samples and to give a brief account of their use in modern industry.

In the following table, the minerals are listed in the order of descending specific gravity.

TABLE 1

Minerals Reported

Mineral	No.	Sp. Gravity	Composition
Heavy Minerals			
Hematite	1	5.26	Fe_2O_3
Sphene (Titanite)	2	5.00 - 5.50	$CaTiSiO_5$
Magnetite	3	5.18	Fe_3O_4
Monazite	4	5.00 - 5.30	(Ce, La, Di) PO_4
Ilmenite	5	4.70	$FeTiO_3$
Zircon	6	4.68	$ZrSiO_4$
Garnet (Almandite)	7	4.25	Lime-aluminum pink garnet
Rutile	8	4.18 - 4.25	TiO_2
Gangue (Waste) Minerals			
Spinel	9	3.60 - 4.00	$MgAl_2O_4$
Pyroxene (Hypersthene)	10	3.40 - 3.50	$(Mg, Fe)_2Si_2O_6$
Hornblende	11	3.20	Complex ferromagnesian
Feldspar	12	2.54 - 2.76	Family of minerals
Quartz	13	2.65	SiO_2

Remarks on Table 1

1) The first 8 minerals are the heavy minerals, the last 5, all below 4.0 Specific Gravity, are gangue.

2) Spectographic analyses of samples from the Company's properties indicated the presence of certain trace elements not otherwise accounted for. The include boron (probably in Tourmaline), strontium, vanadium (possibly occurring with monazite), chromium, copper, manganese, gallium (possibly with magnetite), nickel, cobalt, lead and zinc.

3) Magnetite is strongly magnetic, ilmenite is slightly magnetic. In the field of a powerful electromagnet, as in a separator, many other minerals, especially those containing iron, are drawn to the magnet, although they do not have the attracting power of a true magnetite. Monazite is variably magnetic in a electromagnetic field.

4) Numerous tests on these placer deposits have proved that efficient separation of heavy minerals and gangue may be effected by either gravity separation (e.g. spirals) or screening, the latter at 100-mesh Tyler. The cut-off point of similar separation in fine grained sands is less definite but considerably below 100-mesh.

HEAVY MINERALS RESEARCH AT NATASHQUAN

Although the greatest emphasis at Natashquan was placed on the development of the deposit to produce one million tons of high-grade magnetite concentrate annually for the iron and steel industry, the economic possibilities of the heavy mineral by-products were not overlooked.

Research was started in 1955 at Ville Jacques-Cartier laboratory to determine the technical feasibility of producing by-product ilmenite, hematite, garnet and zircon concentrates from the tailings of the proposed magnetite recovery plant. Three other laboratories collaborated.

Work was initially confined to an investigation of tailings from "Upper-Bed type" sands from which magnetite recovery averaging four per cent had been made.

In January 1957, this part of the research program was complete. The results in the table below are valid for tailings of similar tenor and physical characteristics to those of the test sample and if all tailings from the proposed magnetite recovery plant are treated.

Table 11

Predicted heavy-minerals recovery from terrace deposits

Concentrate	Long Tons per Annum	Fe per cent	TiO_2 per cent	ZrO_2 per cent
Magnetite	1,000,000	65	3.5	-
Ilmenite	400,000	37	46.0	-
Hematite	400,000	58	15.0	-
Garnet	200,000	30	2.0	-
Zircon	20,000	4	4.0	60

Similar studies were planned for the purpose of learning whether similar relationships could be established for the fine-grained lower beds but they were not very well advanced when the Montreal laboratory was shut down in August 1957.

USES FOR HEAVY MINERALS

During the past twenty-five years, there have been great improvements in minerals technology and increasing use of minerals and mineral products. The heavy minerals have shared in the general advance.

The properties of MINES-METALLURGIES-KEBEC Inc. contain large established and potential reserves of certain heavy minerals. They expect soon to be in a position to supply a substantial part of the expanding demand for heavy-media and heavy aggregates, as well as certain eagerly-sought-for strategic minerals.

MAGNETITE

Besides its value as a high-quality iron ore, magnetite concentrated from the Company's North Shore deposits has been shown by research to possess qualities which make it especially desirable for use as a "high density suspension medium", or heavy-media. In this field it can command a premium of $3.00 to $4.00 per ton over that of magnetite shipped as iron ore.

Present markets for magnetite heavy-media are in coal preparation, iron ore beneficiation, the concentration of ores of ilmenite, spodumene, tin and many others. It is used extensively for floating such light minerals as brucite, chrysocolla, graphite, gypsum and sulphur, and has also been used in the treatment of corundum and industrial diamonds. It is most commonly used alone but may sometimes be used with ferrosilicon.

It possesses certain qualities to a superior degree, including hardness, resistance to abrasion, corrosion and chemical action, excellent recoverability and moderate cost.

Increasing use is being made today of magnetite and other high-gravity minerals as heavy aggregates. One such use is as a fine aggregate in the manufacture of heavy weight concrete slabs used as shields to absorb radiation from nuclear reactors and other sources of atomic radiation.

TITANIUM MINERALS (Ilmenite, rutile and sphene)

Ilmenite, rutile and sphene are all present in the Company's unconsolidated deposits of the North Shore but only the first occurs in really significant quantity.

The demand for titanium as metal, alloy and oxide has risen so sharply during the past decade that both ilmenite and rutile have assumed great importance.

For many years, the principal use of this element was in the form of the oxide used in the manufacture of the white pigment which because of its extreme whiteness, high refractive index, chemical stability and relative cheapness was used in the largest volume. However, its use as titanium metal and titanium alloys threatens to surpass that of the pigment use of the oxide. Its light weight as compared with steel, high strength and resistance to high temperatures and corrosion have caused titanium and its alloys to be employed extensively in the fabrication of jet engines and structural airplane parts; in ships, especially naval ships; in military equipment, including cannon, guided missiles, light-weight armor plate for tanks; and in equipment used in the chemical industry.

At Natashquan and the other properties of the Company, ilmenite most commonly occurs in close association with hematite as micrographic intergrowths so that ilmenite concentrate contains a large amount of hematite. As the combination is of high specific gravity, being slightly under that of high density magnetite, it is suitable for use both as heavy-media and as heavy aggregate.

Research performed on heavy minerals from Natashquan (see Table II) showed that good separation of the two minerals can be made by the magnetizing roasting of the ilmenite-hematite concentrate followed by low intensity magnetic separation. This procedure will produce an ilmenite concentrate of about 46 per cent TiO_2 and will recover 35 to 40 per cent of the TiO_2 content of the crude sand. This is similar in grade to the large tonnage produced by the National Lead Company at their Tahawus, N.Y. plant, for use in the manufacture of white pigment. They dispose of the altered hematite fraction resulting from this separation to the steel industry at a penalty because of its high TiO_2 content.

Rutile is a less abundant mineral and its use has been restricted because of its scarcity. Because of its high TiO_2 content, it commands a price several times that of ilmenite. A process has been reported which converts ilmenite into artificial rutile which, applied to the Company's concentrates of the former mineral, may add materially to its earnings.

HEMATITE

On the North Shore, this mineral is most commonly found in association with ilmenite in the form of ilmenite-hematite and, as mentioned above, the suggested use of the concentrate is as heavy-media or as heavy aggregate.

GARNET

As shown by Table 11 above, a considerable tonnage of this mineral may be produced from North Shore beach sands and terraces.

In industry, garnet is used chiefly as an abrasive but the market for mineral particles of-100-mesh Tyler may be somewhat limited. Other possible markets include its use as granules for the protective coating of asphalt roofing and siding and for hardfaced concrete floors. The last could absorb very large tonnages if markets can be developed.

ZIRCON

Zirconia, or ZrO_2, is one of the most refractory substances known and is relatively inert to molten silicate slags and other corrosive agents. Its principal uses, therefore, are in fields where these qualities are most desired.

At Kegashka, the zircon content of beach and terrace deposits at two separate locations was found to be 1.2 to 1.7 per cent. Elsewhere at Kegashka as well as at Moisie and Natashquan, it is between 0.20 to 0.40 per cent ZrO_2 (0.3 to 0.6 per cent zircon).

Tests on tailings from Natashquan showed that zircon may be separated as a marketable concentrate without much difficulty after the gangue, ilmenite-hematite, magnetite and garnet have been removed.

A little hafnium was detected in zircon concentrates produced from the Natashquan "Upper Bed".

MONAZITE

Although this is the least abundant of the heavy minerals reported as occurring in the unconsolidated deposits of the North Shore properties, it is worth mentioning because there is a ready market for all that can be produced.

Monazite is the source of the rare earth elements and thorium which are all becoming of growing importance in industrial and scientific applications. For many years it was kept on the "critical list" of the U.S. government and is still of great strategic importance. It is a very scarce mineral in North America and in the world and present production comes almost entirely from placer deposits.

The manifold uses of monazite are too many to be listed here and are limited solely by its scarcity.

Upgrading of the monazite content of beach and terrace deposits by the elimination of other products may result in the production of small quantities of monazite concentrate at relatively low cost, but no research has been done to that end as yet.

VANADIUM

The presence of vanadium has been detected by semi-quantitative spectographic analyses on several occasions but its mineral occurrence has not yet been identified.

Numerous chemical analyses on concentrates from the Kegashka deposits have shown that magnetite concentrates contain 0.5 per cent V_2O_5, ilmenite concentrates 0.27 per cent V_2O_5 and heavy-minerals residues (i.e., less magnetite and ilmenite) 0.02 per cent V_2O_5. This would indicate that the element is in a form that would permit it to respond to an electromagnetic field. Vanadium very often occurs in association with monazite in placer deposits. Monazite is not magnetic under ordinary circumstances but it will become so if subjected to an electromagnetic field. If the field is of high intensity, it becomes almost ferro-magnetic.

It would appear, therefore, that the vanadium detected at Kegashka is associated with monazite; that under the field of low intensity magnetic separation, some of it passes into the magnetic fraction with magnetite; that under that of high intensity magnetic separation, most of the remainder passes into the ilmenite fraction until only a small residue remains.

PROPERTIES CONTAINING DEPOSITS OF HEAVY MINERALS

Introduction

The three properties owned by MINES-METALLURGIES KEBEC Inc. on the North Shore of the gulf of St. Lawrence are: a) Sept-Iles-Moisie, b) Natashquan-Kegashka and c) Harrington. All contain deposits of unconsolidated "black sands" with their associated heavy minerals.

The Sept-Iles-Moisie property is located 330 miles below the city of Quebec in the townships of Letellier and Moisie, county of Duplessis. It comprises 11,632 acres consisting of 1,632 acres of private beach lots and some 10,000 acres acquired by staking. The property lies on both sides of the mouth of the Moisie river and the beach lots extend for a distance of more than twelve miles along the gulf shore.

The Natashquan-Kegashka group consists of two consolidated mining properties referred to elsewhere in this report as the Natashquan and Kegashka properties respectively. They are located 530 to 540 miles below Quebec.

The Natashquan property was acquired by the Company, October 25, 1962, and the larger part is held under long term exploitation permit No 27249, originally issued (to Aconic Mining Corporation) by the Department of Mines, Quebec, under the date of December 1st, 1955. It has a surveyed area of 31,562.78 acres, embracing the bed of the Great Natashquan river in its lower reaches as well as the Natashquan terrace, or terraces, lying mainly north of the river.

The remainder consists of a patented industrial site of 2,000,000 square feet (46 acres) in the harbor area north of Natashquan village and six patented mining lots on the gulf of St. Lawrence comprising nearly 2,400 acres.

The Natashquan property is located in the townships of Natashquan and Duval, county of Duplessis.

The Kegashka property consists of 38,000 acres acquired by staking and 2,200 acres of patented land upon which this Company holds exclusive mining rights. It is located in the townships of Duval, Kegashka and Musquaro, county of Duplessis.

SEPT-ILES - MOISIE

The earliest record of serious mining activity on the North Shore appears to be that which concerns the operations of the Moisie Iron Company between 1867 and 1875. They operated eight furnaces which produced pig iron. Their principal market was in the United States where the iron was esteemed for its high quality. Influential American iron interests succeeded in March 1875, in having its tariff classification changed from "pig iron", carrying a duty of $7.00 per ton, to "bar iron", carrying one of $33.60 per ton. Under these circumstances, Moisie pig iron ceased to be competitive on the U.S. market and, as the Canadian demand for this product was small, the operation was closed down and abandoned.

The black sands at Moisie are well exposed along the beach of the gulf for four or five miles eastward from the estuary of the Moisie river and also for about two miles from a point three miles west of the estuary. There is also a band several hundred feet long on the concave shore of the estuary itself. Overlooking the beach, there are terraces composed of magnetite-bearing sand extending for unknown distances.

Part of the beach was sampled by E. Dulieux in 1911 and a composite made up of 29 individual samples yielded, on analysis, 36.42 per cent Fe and 7.48 per cent Ti (14.96% TiO_2). It represents the sampling of two miles of beach east of the mouth of the river. After concentration by hand magnet, the composite magnetic fraction gave 67.17 per cent Fe and 1.46 per cent Ti (2.92% TiO_2). He estimated that superficial deposit to contain 40,000 tons of magnetite concentrate.

He also sampled part of the terrace deposit to a distance 500 feet back from the gulf and estimated that a strip one mile long, 500 feet wide and 6 feet deep would yield 57,000 tons of magnetite concentrate at 65.67 per cent Fe, and that this concentrate would represent 6.8 per cent by weight of the original sands.

Sampling was performed on behalf of MINES-METALLURGIES-KEBEC Inc. on the beaches lying on either side of the mouth of the Moisie river. Twenty samples from the eastern stretch of beach yielded values slightly higher than those of Dulieux. Direct sampling results do not appear to have been sought by Dulieux west of the river but bulk sampling in this area for the Company at Woolve's cove yielded a concentrate of magnetite which, upon analysis, returned 69.70 per cent Fe and 16.29 per cent TiO_2.

COMMENT

The results published by Dulieux and republished in subsequent descriptions of the Moisie "black sands" do not begin to tell the whole truth about this property. He sampled only about one per cent of the area currently held by this Company. He sampled only part of the beach area where "black sands" are known to occur and only part of the terrace. He does not appear to have sampled the concave beach inside the mouth of the Moisie river estuary at all. The purpose of his investigation in 1911 was to establish the iron ore potential in the beach area and it is natural that he should direct most of his attention to the very richest sections.

In terms of 1965 and the objectives of the present Company, his estimate of 97,000 tons of high grade magnetite ore as the total that may be expected from the area is much too limited, as it does not take into account the large tonnage of lower grade material that experience at Natashquan has shown can be expected to occur elsewhere on this property.

Further, experience at the other Company properties justifies a tentative estimate of a heavy mineral reserve in the only area sampled by Dulieux of about 200,000 tons of concentrate including magnetite and ilmenite-hematite which again represents less than 1% of the Company's holdings in the Moisie area.

This property should be sampled much more thoroughly.

NATASHQUAN

The writer's report to Aconic on this property, dated May 9, 1960, is on file with the Department of Natural Resources, Quebec, and only a summary is given here. Said report describes in some detail the work performed between 1954 and 1958 to develop the property and concludes with some recommendations.

The Aconic operation had as its chief objective the mining and preparation of magnetite concentrates of high quality for the steel industry. The potential of its associated heavy minerals such as ilmenite-hematite, garnet and zircon was recognized but they were primarily regarded as by-products that would yield additional income to an operation that otherwise was expected to be self-sustaining.

The present Company's approach to the problem of successfully exploiting the mineral resources of the Kegashka, Natashquan and Moisie properties differs from that of Aconic in that a self-sustaining operation can be expected on the basis of the production and marketing of all of the heavy minerals that are present. They will not, therefore be committed to the large-scale production contemplated by Aconic and can safely engage in selective mining to ensure the optimum return on capital investment.

HISTORY OF OPERATION

The present Natashquan holdings of MINES-METALLURGIES-KEBEC Inc. were staked on behalf of Aconic Mining Corporation in February and March 1954, and were prospected and mapped by the writer the same summer. Wash-boring (drilling) and bulk sampling were also performed in a test area of slightly under two miles.

Results from drilling and sampling indicated the presence of a deposit of magnetite-bearing sands belonging to the Champlain series containing approximately 200,000,000 metric tons to a depth of 65 feet and averaging 4.09 per cent Fe and 0.54 per cent TiO_2. The presence of other heavy minerals was also noted.

These results excited the interest of the German engineering firm of Klockner & Company, Duisberg, West Germany. They proposed that they be permitted to collaborate in the design and construction of a pilot plant intended to establish the most efficient flow sheet for the treatment of Natashquan sands. Aconic accepted their proposal and the plant was ready for tuning-up and testing in September 1955.

Numerous equipment and flow-sheet changes proved to be necessary, however, and it was not until July 28, 1957, that Klockner's technical staff at Natashquan were able to announce that the plant was at last ready for operation.

Klockner & Company then pressed for final acceptance of the pilot plant and took the initiative in calling upon La Société Générale de Surveillance S.A., Geneva, to supervise the running of a Mill Performance Test. This was done on October 3 and 4, 1957, and the supervisory body issued to them a certificate to the effect that they had fulfilled their part of the agreement with Aconic by supplying a concentration plant that was capable, a) of treating and concentrating 220 metric tons of crude per hour; b) of recovering 90 per cent of the magnetite present in the crude sand; c) of producing magnetite concentrate containing more than 65 per cent Fe and less than 3.85 per cent TiO_2. This plant was acquired by MINES-METALLURGIES-KEBEC Inc. in 1962.

During the period under review, an analytical laboratory was established at Natashquan and a testing laboratory at Ville Jacques Cartier near Montreal. The latter ran numerous bulk tests on crude sands, concentrates and other plant products for the purpose of learning how to improve magnetite recovery and grade. In collaboration with other laboratories, the Montreal laboratory followed other lines of research relating to the utilization of heavy-mineral concentrates as heavy-media and in other industrial applications.

In the same period, further exploration resulted in an increase in the mine reserve both in tonnage and in depth. Under the new management, the area previously explored was re-drilled in 1958 as part of a program of reappraisal. The field of investigation was enlarged to include systematic drilling of the bed of the Natashquan river from its mouth to four miles upstream and the Natashquan terrace in both directions east and west from the original test area.

Potential mine reserves established by the 1958 drilling proved to be 1,500,000,000 long tons of magnetite-bearing Champlain sands, averaging 3.73 per cent Fe in an area of 13.7 square miles and to a depth of 88.4 feet. Part of this area, centred on the present mine and concentration plant was selected as the immediate mine area, and designated New Area "C". It has an area of 5.47 square miles and a mine reserve of 645,000,000 long tons averaging 3.98 per cent Fe to a depth of 95 feet.

Following the completion of their study, Aconic announced, April 24, 1959, "Cost estimates for bringing the Natashquan iron sands property of Aconic Mining Corporation into major production indicate that an economically feasible operation may be achieved on a concentration ratio of 60 tons of crude sand to 1 ton of concentrate. . . . This estimate is based on a maximum cost for dredging and ore concentration estimated at 12 cents per crude ton. The trend of costs of dredging operations continues to decline as more experience and larger efficient dredging units are brought into general usage".

COMMENT

More intensive research has probably been performed on the Natashquan deposit, particularly with reference to large scale operation, than on all of the other North Shore deposits of similar character combined. The investigations embraced research on the high grade lenses and on the lower grade material associated with them so that it is fair to state that most of the major theoretical technical problems have been solved.

The importance of the previous statement lies in its applicability to the other Company properties of Kegashka and Moisie which are in many respects similar to Natashquan. The similarity extends not only to the physical geology and geologic history they share but also to their mineralogical associations and structure.

It was learned at Natashquan that the associated beds of the Champlain series contain magnetite and the other heavy minerals in amounts sufficient to justify their incorporation as part of the mine reserve, which comprises 27.4 per cent of the 32,000 acres held under the exploration permit already referred to. It is probable that this big property may contain a large potential reserve that has not been investigated as yet chiefly because there seemed to be no immediate necessity for doing so.

That necessity does exist, however, at both Kegashka and Moisie, where less than 5 per cent of the former and about 1 per cent of the latter have been investigated and then only with reference to the mineral content of the best mineralized beds.

At Natashquan, no estimate has been made of the reserve of heavy minerals even in the drilled area. In the medium and high-grade beach sands, their Upper Bed, it is certainly twice that of the recoverable magnetite cited in Table II. Less detailed studies were made of the lower grade associated deposits to determine the amount of each heavy mineral actually present but not necessarily recoverable and yielded variable results. In those known to the writer, the ratio of magnetite-free heavy minerals to magnetite is commonly higher than in the best grade material, so that, subject to later correction, the overall percentage of recoverable heavy minerals in the present mine reserve at Natashquan can be set tentatively at 6 per cent and 8 per cent or more in the Upper Bed.

KEGASHKA

This is the eastern member of the Natashquan-Kegashka group (see Appendix 3). Together the two consolidated properties extend east and west 27 miles and at their widest, south of the village of Natashquan, extend north and south $6\frac{1}{2}$ miles. They form an irregular wedge-shaped figure with truncated apex aligned with the shore line of the gulf of St. Lawrence and contain within their boundaries the greater part of the Natashquan terrace.

The terrace is dissected by several southward flowing streams and by the Natashquan and Kegashka rivers. In the eastern part of the Kegashka property, the interior is characterized by the presence of a multitude of small lakes, ponds, water courses and

patches of muskeg. Rock outcrops occur at many places but they are surrounded by areas of peat or mineralized sands similar in most respects to those occurring on that part of the terrace lying west of the Natashquan river.

The character of the surface changes in the vicinity of the gulf shore. It is drier and free from lakes, ponds and muskeg, being lightly wooded with stunted conifers. Where the surface is exposed, it is composed of medium-grained sands with visible magnetite and ilmenite-hematite mineralization.

The seaward-facing edges of the terrace show signs of extensive erosion which, while sparing very large areas of the coastal terrace, has removed large sections so that occasional rocky outcrops occur on the shore and the offshore islands are practically denuded of the deposits that possibly once covered them.

The largest section of the coastal terrace that remains extends from the eastern end of the property at the bay of Kegashka westward 31,000 feet to Iron bay (or Bradley's cove), the whole roughly centering on the island and village of Kegashka.

PRINCIPAL DEPOSITS

At the eastern end of the property, the terrace slopes downward toward the bay of Kegashka from a height of 20 to 30 feet. There is no true bluff in this locality.

West of Kegashka village, the terrace overlooks Clam bay from a height of 30 to 40 feet and a projection extends southward from the approximate center of the bay toward some rocky offshore islands. As the bluffs approach the end of this projection, locally named Oyster point, they drop abruptly to form a low sand spit.

West of Clam bay, the terrace diminishes in height in the direction of Iron bay where it is only 4 to 5 feet high and lies immediately above the beach. In land from this low terrace, the surface gradually rises to a height more in conformity with its elevation to the east.

The width of the dry coastal terrace where most of the sampling has been performed to date is variable and is greatest directly north of Oyster point where it is about 6,000 feet. It is 4,000 feet wide north of the island of Kegashka and less elsewhere. Between Iron and Kegashka bays, it has a superficial area of 1,920 acres and will yield approximately 3,100,000 cubic yards of mineralized crude per foot of depth to the beach level. As the data available are incomplete, it is not possible at this time to estimate the mine reserve of this deposit in terms of total tonnage and average grade. However, a limited amount of drilling in this area will correct this deficiency and permit such an estimate to be made.

Extensive sampling has been performed on the faces of the bluffs, on the beaches and at various places from the top of the terraces. Drilling by hand auger yielded valuable information but, as it cannot be used for depths below the water table, this method of sampling is limited to the surface of the dry terrace.

At Clam bay, the strongest mineralization occurs in a layer 4 to 5 feet thick near the top of the bluff west of Oyster point. It is natural heavy-minerals concentrate with narrow bands of magnetite and ilmenite-hematite. A series of ten samples taken here yielded remarkably uniform returns: 26.5 to 28.9 magnetite, 35.0 to 38.1 ilmenite and 1.4 to 1.7 per cent zircon. Heavy minerals with somewhat less magnetite occur elsewhere on the face of the bluff. A 41-foot channel sample from top to bottom showed more than 10 per cent heavy minerals including 4.8 per cent magnetite. The percentage of zircon in the natural concentrate is noteworthy as it is the highest ever recorded on any of the Company's properties.

At Iron bay, the terrace, as previously stated, is 4 to 5 feet high and lies above the present beach. It may not be the westerly extension of the main terrace at all but instead a concentration of the heavy minerals from an eroded section of the same, of which the upward slope behind the beach may be a remnant. This deposit consists of medium grained sand with even stronger mineralization than the Oyster point deposit. Repeated sampling in this area showed a heavy minerals

content of 80 to 95 per cent, including 30 per cent magnetite, 40 per cent ilmenite and 1.2 to 1.4 per cent zircon. Although lower than that of the previously described deposit, the zircon content at Iron bay is also notable.

The slope behind the Iron bay showing, which is possibly an eroded portion of the main terrace, was also sampled and yielded values of 12 per cent heavy minerals with 4 per cent magnetite at a distance of about 1,000 feet inland from the beach.

West of the rocky point forming the west boundary of Iron bay is the so-called "long beach" extending 4,000 feet which yielded 15 per cent heavy minerals of which 6 per cent was magnetite.

The foregoing are the most striking known deposits of heavy minerals but there are certainly others that the methods of exploration and drilling employed so far have been unable to disclose. This includes practically everything that is not actually visible or is below the water table. They need not have as high mineral content as those already described to be of great economic importance.

There are still other known heavy-minerals deposits that have so far not been mentioned in this report. They include the many miles of beaches along the gulf shore in areas outside those considered above. They contain varying quantities of heavy minerals and locally may be mineable. There are also offshore deposits which are visible from a boat on a calm day at many places along the coast, especially in Kegashka bay where black sands carpet the bottom of the bay over an area of 3,000 by 900 feet and yielded values of

4.5 per cent magnetite on the average. In the latter place sampling was by iron pipe from the ice in winter and the limitations of this method of sampling are illustrated by the fact that it was impossible to drive the pipe deeper than 1.4 to 1.8 feet. Finally, there is a small deposit of very high grade material at the mouth of the Kegashka river.

TESTS

Great numbers of analyses were performed on samples from the Kegashka deposits to determine their grade and characteristics and include mineralographic, screening, semi-quantitative spectrographic and chemical analyses. Some of the most important of these have been discussed in the present report. There have also been numerous bulk tests.

Tests at the provincial pilot plant in Quebec produced concentrates of magnetite ranging up to 70.3 per cent Fe and 1.56 per cent TiO_2.

Other tests performed at the Sorel laboratory of the Quebec Iron and Titanium Corporation showed that the specific gravity of Kegashka magnetite concentrate is 5.09 to 5.13 and is higher than that of the magnetite currently used there in heavy-media concentration of ilmenite by cyclone.

An airborne magnetometer survey by the Canadian Aero Service on behalf of the Quebec Department of Mines was made in 1951 and covered most of the area of the consolidated properties.

Anomalies were disclosed on both properties, one of which was drilled at Natashquan with inconclusive results. It is thought that the anomaly is attributable to some sub-surface feature below the depths reached in drilling or in the underlying bed-rock. Used as a ground instrument, a magnetometer was employed at Kegashka to test certain small promising areas and fair agreement between instrument readings and sample results was reached.

COMMENT

No overall estimate can yet be made of the deposits of probable economic importance at the Kegashka property. When established, they are expected, in the areas described alone, to amount to tens of millions of cubic yards.

In view of the great amount of work involving analyses and tests performed on material from the most attractive showings, it is probable that enough additional information can be obtained from a co-ordinated drilling campaign of relatively short duration to permit the calculation of a substantial mine reserve based on the important deposits at Iron bay, Clam bay and Kegashka bay.

COPPER DEPOSIT

The copper prospect referred to in the introduction to this report consists of a rectangular block of ten mining claims having a total area of 400 acres. They are located in townships 1380 and 1381 in the county of Duplessis, province of Quebec, and are situated on the east bank of the Natashquan river approximately 45 miles north from its mouth.

The geological environment is essentially one of pre-Cambrian quartzite and schists which have been intruded by a series of gabbro-diabase sills. At numerous places in the area, chalcopyrite occurs in fissures either within the intrusive rocks or along their contacts.

One of these sills crosses the Company's claims from east to west for a distance of 1-1/4 miles. It is intrusive into quartzite and is 0.4 to 0.8 miles wide.

Here and there mineralization occurs within the boundaries of the gabbro in the form of disseminated pyrite and chalcopyrite. At one locality in the western part of the property, a zone of such disseminated material was traced for about 50 feet and found to be localized along a fracture, probably a joint, striking at N 88° E and dipping north at 67°. Two samples were taken which yielded respectively 2.28 per cent copper per ton and $0.31 in gold and 4.78 per cent copper and $1.26 in gold.

COMMENT

The above description is based on a report submitted to the Company by a visitor to the claims who was unable to prospect them thoroughly due to shortage of time.

The results are encouraging and an experienced prospector should be sent to the property to investigate more fully.

RECOMMENDATIONS

Introduction

MINES-METALLURGIES-KEBEC Inc. have already established a policy with regard to the utilization of the mineral deposits on their properties which is based on: 1) The presence of large established and potential reserves of heavy minerals; 2) The presence and accessibility of high grade deposits, especially at Kegashka.

Plans are already well advanced which include the following:

1) To start operations at Kegashka on a limited scale at first using a floating mining and extraction plant, which may consist of a portable suction dredge in the 12-inch range and auxiliary barges carrying equipment for gravity separation of bulk heavy minerals from gangue and low intensity magnetic separation of magnetite from the other heavy minerals.

2) To start with Kegashka because of the presence of two high grade deposits of heavy minerals large enough to justify the initiation of such an operation at a very early date, the accessibility of the deposits to a floating plant, the availability of local labor, the presence of a recently constructed and substantial wharf at the village of Kegashka and the existence of a road between Iron bay and the wharf.

3) To acquire other promising properties of this type, especially those adjoining or near to those already in the possession of the Company.

4) To start with the production of high density magnetite for heavy-media and heavy aggregate or bulk heavy minerals for heavy aggregate.

5) To expand the operation as circumstances permit to include the other properties belonging to the Company or adding another extraction unit at Kegashka or both.

Based on the best available information, the estimated cost of the dredging will be 4 to 6 cents per cubic yard and that of producing bulk heavy minerals concentrate by gravity separation (spirals), 4 to 5 cents per cubic yard, ie. between 2 or 4 cents per ton of feed.

RECOMMENDATIONS

Many of these are applicable to all properties owned by the Company:

1) Selective mining of high grade deposits is possible only within certain limits and the first objective should be to establish the minimum acceptable grade consistent with scale and area of operation.

a) Examine test and analytical results and plot all relevant data on plan to serve as basis for estimate of local mineable reserve or reserves.

b) If not already done, sample adjacent areas to combine with above.

c) Check similarly the beds underlying the medium-grained beach and terrace sands at least to depth of dredge channel, which is expected to be 30 inches or more.

d) There is no purpose to be served in attempting at an early stage in the operation to establish total mine reserves on any of these properties. It should be sufficient to build up a reserve large enough for three to five years at a time on the scale of the operation planned.

2) Establish a small shore-based analytical laboratory near enough to the operation so that results may be quickly available to the plant superintendent.

3) Select dredge on basis of production planned for first year of operation. Dredge and floating equipment should be chosen with a view toward their eventual incorporation with similar units for large-scale operation.

4) Exploration is recommended to locate other high grade deposits, especially in stream beds and on river bluffs, also buried or eroded terraces. If they look promising, they may be cheaply investigated above water table by hand auger manned by two men.

5) Systematic exploration of property by wash-boring. Ground will be covered quickly by establishing grid with 2,000 foot centers and drilling at intersections. In promising areas, especially those close to known high grade deposits, intermediate holes should be put down to avoid missing rich sections which are often narrow and may be overlooked if the intervals between holes are too great.

6) Arrange for research for new uses for heavy minerals, also new products or variations of established products that can be manufactured or processed by subsidiary companies. This applies also to investigation of reported process whereby ilmenite may be converted into synthetic or artificial rutile commanding a higher price.

7) Information available dealing with the copper prospect is encouraging but as yet insufficient to assist in drawing conclusions as to its merit. If possible, an experienced prospector should investigate the entire property, especially in the vicinity of the big gabbro-diabase sill and along its contacts.

8) The writer recommends that use be made of the camera to photograph mineral deposits, environment and equipment and to record the work in progress for head office information. The most useful photographs so obtained should be enlarged and filed for reference.

In the present state of knowledge of the deposits at Natashquan, Kegashka and Moisie, it is concluded that: 1) a large scale operation could be started at once at Natashquan; 2) a limited scale operation could be started at once at Kegashka; 3) an operation at Moisie should be postponed until further information is obtained. For reasons given elsewhere in the report and below, an operation at Kegashka should be granted precedence.

The established mine reserve at Natashquan is known to be of ample tonnage and tenor to support a large scale operation leading to the profitable recovery of magnetite as iron ore. If considered as a heavy mineral suitable for specialized use outside the steel industry, however, magnetite will command a higher selling price per ton and, together with ilmenite-hematite, garnet and possibly monazite concentrates, can be expected to yield much larger returns.

Limited scale operation cannot be profitable at Natashquan because the medium to high-grade sections probably could not be mined selectively. Moreover, they represent only a very small percentage of the total known reserve. To operate profitably, it must be on a large scale.

At Kegashka, the situation is quite different. Although there is no true <u>established</u> mine reserve at this property, the tenor and wide distribution of very high grade crude available for conversion into bulk heavy-minerals concentrates indicates that there is here a large <u>potential</u> reserve sufficient to justify a limited scale operation. Exploration and drilling centered on known deposits should define the boundaries of the best ore and supply data for an early estimate of mine reserve. On the basis of available data, it is believed that, volume for volume, the Kegashka deposits will prove to be of higher tenor than those at Natashquan. Its accessibility and other advantages previously mentioned commend the choice of Kegashka as the site of the initial Company operation.

Moisie is as yet the least developed of the three properties. Due to the essential similarities of the deposits from property to property, it can reasonably be expected, after exploration and drilling, to augment the Company's mine reserves. In several important respects, it resembles Kegashka rather than Natashquan and will doubtless prove to be amenable to a similar program of development and exploitation.

Respectfully submitted,

James A. Bragg

CERTIFICATE

I, Alton Charles Bray, do hereby certify as follows:

1) That I am a Consulting Geologist, currently residing at Montreal in the Province of Quebec;

2) That I am a graduate of McGill University in Mining Engineering with the degree of Bachelor of Science and of the School of Graduate Studies at McGill University with the degree of Master of Science;

3) That I have practised my profession of Geologist and Consulting Geologist for more than twenty-five years;

4) That because of extensive prior experience with the magnetite and heavy-minerals-bearing deposits at Natashquan, I have been retained as Consulting Geologist by MINES-METALLURGIES-KEBEC Inc. for the purpose of writing this report;

5) That I have no personal interest, either directly or indirectly, in any property of MINES-METALLURGIES-KEBEC Inc. and do not expect to receive, either directly or indirectly, any interest in the securities of that Company.

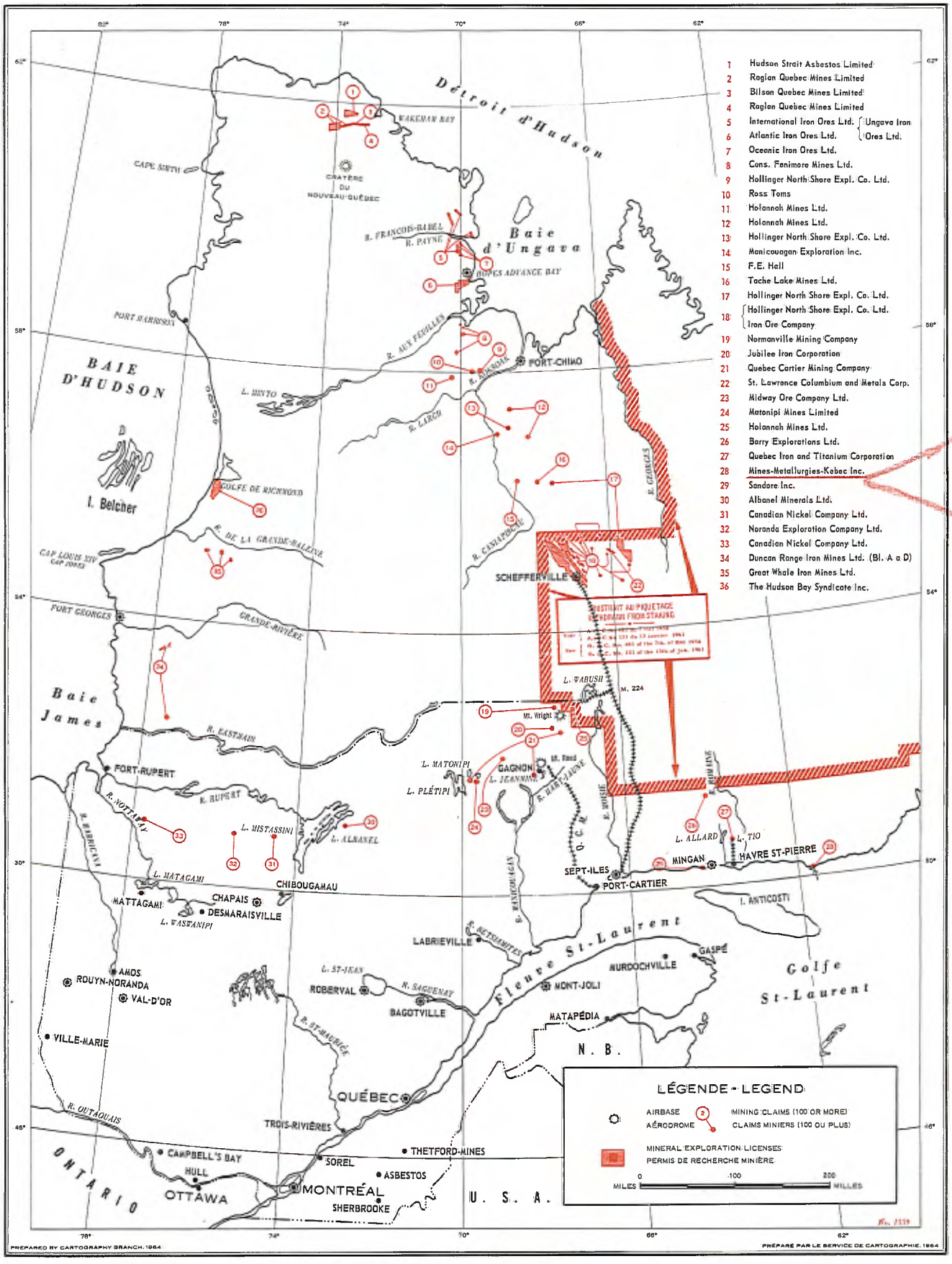
Dated this 17th day of March, 1965, at Montreal.

Alton C. Bray
Consulting Geologist

QUÉBEC

MINISTÈRE DES RICHESSES NATURELLES
RENÉ LÉVESQUE
MINISTRE MINISTER

DEPARTMENT OF NATURAL RESOURCES
PAUL-E. AUGER
SOUS-MINISTRE DEPUTY-MINISTER



MAIN MINING DEVELOPMENTS NORTH OF 50TH PARALLEL
PRINCIPAUX DÉVELOPPEMENTS MINIERS AU NORD DU 50E PARALLÈLE

13-3-64

PLAN N° 7

CANADA

PROVINCE DE QUEBEC

DISTRICT DU SAGUENAY

BUREAU D'ENREGISTREMENT
DIVISION DE SEPT-ILES

A la requisition de Me J. Léon Côté, Avocat de Québec, j'accorde par les présentes un certificat des enregistrements contre les lots: QUARANTE-ET-UN-A, QUARANTE-ET-UN-B, QUARANTE-ET-UN-C, QUARANTE-DEUX-A et QUARANTE-DEUX-B (41-A, 41-B, 41-C, 42-A, 42-B) Village Petit-Natashquan (non-incorporé) aux plan et livre de renvoi du cadastre officiel pour le canton de Natashquan depuis le 1er septembre 1962, date de l'ouverture de ce bureau et ce jusqu'à ce jour.

ITEM 1

Enregistrement No: 321

VENTE par Harrison C. Hayes et Peter A. Lawrence, Syndicts conjoints dans l'affaire de faillite de Fernand Daigle et agissant en conformité d'une résolution des inspecteurs duement homologuée par un jugement de la Cour Supérieure, en faveur de MINES-METALLURGIES KEBEC INC. pour le montant de $35,000.00 payé comptant. Cette vente affecte lesdits lots et une partie du 41-A, elle comprend aussi les droits, la machinerie et l'équippement, le tout est sujet aux autres conditions mentionnées.

Claude Taschereau Notaire
le 25 octobre 1962, Min: 11082
Enregistré le 5 novembre 1962.

Tout ce dont je donne certificat à Sept-Iles en ce quinzième jour du mois de juin 1963.

Léo Dufresne
Régistrateur

$2.80

56

APPENDIX 6

ANNOTATED LIST OF LOTS AND CLAIMS OWNED BY THE COMPANY

a) SEPT-ILES - MOISIE PROPERTY (Ref. Plan 2)

i) Mining concession patented in March ~~1909~~ 1906 for inferior metals, known as beach lot No. 5, including 4, having an area superior to 1600 acres (yellow on plan 2); titles registered in Saguenay and Duplessis Registration Division, see also agreement "Y".

ii) Mining claims held under Art. 85 of Mining Act.

Certificate No.	Claim	Area	Location	Expiration	Remarks
209188	1	320 a.	Beach lot Moisie	Dec.15,1965	Subject to be converted into exploitation licence upon completion of statutory work.
"	2	320 a.	Beach lot Moisie	Dec.15,1965	
"	3	320 a.	Beach lot Moisie	Dec.15,1965	
"	4	320 a.	Beach lot Moisie	Dec.15,1965	
209189	1	1280 a.	Moisie River Mouth	Dec.15,1965	
209195	1	1280 a.	Moisie River Mouth	Dec.15,1965	
209191	1	1280 a.	Upper Terrace West	Dec.15,1965	
209192	1	1280 a.	Upper Terrace East	Dec.15,1965	
209193	1	1280 a.	Lower Terrace West	Dec.15,1965	
209194	1	1280 a.	Lower Terrace East	Dec.15,1965	
209190	1 à 4	1240 a. / 10200 a.	Letellier + Moisie	" 14,1965	

b) NATASHQUAN - KEGASHKA CONSOLIDATED DEPOSITS (Ref. Plan 3)

i) Mining concessions patented for inferior metals in 1911, rights to secure on lots Nos. 16, 18, 22, 25, 26, Range 1 Duval, and 32, Range 1 Kegashka, approximate area 2,400 acres. See photocopy of certificat of searches (Appendix "X").

ii) Long term exploitation agreement on ~~1872~~ 1871 patent lots Nos. 1, 2, 3, 4, 5, 6, Range 1 Musquarro, for unconsolidated deposits of inferior metals (see agreement "Y"). 2,127 acres

iii) Long term exploitation licence No. 27,249 issued by the Department of Mines on 31,650 acres in Natashquan Township, first period to expire on November 31, 1965. A letter from the Minister of Natural Resources dated July 27, 1964, provides for the renewal of the above licence for an additional period of ten years commencing December 1st, 1965. (According to law, said licence is further renewable by ten year periods).

iiii) Mining claims held under Article 85 of Mining Act. (See following page)

iiii) Mining claims held under Article 85 of Mining Act.

Certificate No.	Claim	Area	Location - Township	Expiration
G-11195	1	1280	Musquarro east of lot 6	Oct. 12,1966
C-216633	1-2-3-4	1280	Kegashka, Beach lots in front of lots 25 to 31	Oct. 8, 1966
C-218906	1-2-3-4	1280	Kegashka, Beach lots in front of lots 32,33,34 and an undivided part of the said township	"
C-216632	1	1280	Kegashka east of lot 34	Oct. 19,1966
C-216634	1	1280	Kegashka undivided part	"
C-218907	1-2	1200	Kegashka, north of lots 33,34	"
C-219365	1	1280	Kegashka, north of lots 29,30	"
C-219366	1	1280	Kegashka undivided part	Oct. 17,1966
C-219367	1-2-3	1280	Kegashka Beach lots	"
C-219368	1	1280	Duval, east of Natashquan river	Oct. 20,1966
C-219369	1	1280	Duval undivided part	"
C-219370	1	1280	Kegashka, north of lots 31,32	Oct. 19,1966
C-219371	1	1280	Kegashka, north of lots 27,28	"
C-219372	1	1280	Duval,east of Natashquan river	Oct. 20,1966
C-219373	1	1280	Duval, part of Natashquan river	"
C-219374	1	1200	Duval, north of lots 20,21,22	"
C-219375	1	1280	Duval, 1 mile of lots 25,26	"
C-219376	1	1280	Kegashka - Havre de Kegashka	Oct. 17,1966
		22880 a.		

(For 15 last certificates, see document "Z")

c) NATAGAMU AND LACROIX RIVER DEPOSITS (HARRINGTON)

Certificate No.	Claim	Area	Location - Township	Expiration
212679	1	1280	Bellecourt, undivided part	April 25, 1966
212680	1	1280	St-Vincent, undivided part and beach	"
212681	1	1280	Bellecourt, undivided part and beach	"
212682	1	1280	Bellecourt, undivided part	"
212683	1	1280	St-Vincent, undivided part and beach	"
212684	1	1280	Bellecourt, undivided part and part of Natagamu river	"
		7680		

d) MINING CLAIMS (400 acres) HELD IN CONFORMITY WITH PROVISIONS OF ART. 60 OF MINING ACT, STAKED AS A COPPER PROSPECT (see plan 4)

Certificate No.	Claim	Area	Location	Expiration
216630	1	40		July 10,1966
	2	40	Townships	"
	3	40		"
	4	40	1380	"
	5	40		"
216631	1	40	and	"
	2	40		"
	3	40	1381	"
	4	40	1380	"
	5	40	See plan 4	"
		400 acres		

CANADA

PROVINCE DE QUEBEC

DISTRICT DU SAGUENAY

BUREAU D'ENREGISTREMENT
DIVISION DE SEPT-ILES.

A la requisition de Me J. Léon Côté, Avocat de Québec, j'accorde par les présentes un certificat des enregistrements contre les lots: SEIZE, DIX-HUIT, VINGT-DEUX, VINGT-CINQ et VINGT-SIX (16, 18, 22, 25, 26) du rang un (1), aux plan et livre de renvoi du cadastre officiel pour le canton de Duval depuis le 1er septembre 1962, date de l'ouverture de ce bureau et ce jusqu'à ce jour.

ITEM 1

VENTE par Harrison C. Haye et Peter A. Lawrence, Syndict conjoints dans l'affaire de faillite de Fernand Daigle et agissant en conformité d'une résolution des inspecteurs dûement homologuée par un jugement de la Cour Supérieure; en faveur de MINES-METALLURGIES HEBEC INC. pour le montant de $35,000.00 payé comptant. Cette vente affecte lesdits lots, elle comprend les droits, la machinerie et l'équipement; le tout est sujet aux autres conditions mentionnées.

Claude Taschereau Notaire
le 25 octobre 1962, Min: 11082
Enregistré le 5 novembre 1962

Tout ce dont je donne certificat à Sept-Iles en ce quinzième jour du mois de juin 1963.

$2.80

Léo Du Sève
Régistrateur

MEMOIRE DE CONVENTION signé à Québec, ce trentième jour de juillet mil neuf cent soixante-quatre;

ENTRE

Lt.-Col. JOS.-LEON COTE résidant à 560 avenue Laurier, Québec, ci-après appelé

" PARTIE DE PREMIERE PART "

ET

MINES-METALLURGIES-KEBEC Inc. (libre de responsabilité personnelle), compagnie dûment constituée par lettres patentes en vertu de la Loi des mines, ici agissant et représentée par MM. BENOIT JONCAS et le brigadier PAUL TRIQUET, respectivement président et vice-président de la compagnie, dûment autorisés aux fins des présentes, ci-après appelée

" PARTIE DE SECONDE PART "

LESQUELLES PARTIES ont déclaré, convenu et statué comme suit:

ATTENDU qu'en date du 20 janvier 1961, les parties aux présentes ont signé une convention d'une durée de deux (2) ans expirant le 31 décembre 1962, laquelle convention est annexée aux présentes comme annexe "A", relativement à l'exploration, au développement et à la disposition des lots 1 à 6 du rang 1, canton Musquarro (Duplessis), propriété de la Partie de Seconde Part;

ATTENDU que les dispositions de ladite convention ont été prolongées jusqu'au 31 juillet 1964 conformément à la lettre annexée aux présentes comme appendice "B";

ATTENDU que la Partie de Seconde Part est détenteur du permis à long terme N° 27249 et qu'en date du 27 juillet 1964, l'Honorable Ministre des Richesses Naturelles a consenti au renouvellement dudit permis pour une période additionnelle de dix (10) années tel que prévu à la loi, et qu'il est dorénavant loisible à la compagnie de détenir ledit permis jusqu'au 31 novembre 1975;

ATTENDU qu'au cours de la durée de la convention contenue à l'appendice "A" et au cours de sa période de renouvellement la Partie de Seconde Part a fait sur les immeubles de la Partie de Première Part les travaux d'exploration et de développement minier suivants, savoir:

1) Relevé au compteur Gingher de toute l'étendue des susdits lots;

2) Relevé au magnétomètre en surface ou aiguille d'inclination de la susdite étendue;

3) Channel sampling de toute la face des parois de la terrasse depuis le lot 1 au lot 6 susdits;

4) S'inspirant des résultats fournis par les opérations 1 à 3, elle a pratiqué des forages jusqu'au roc dans le cas des lots 1 et 2 et jusqu'à une profondeur de vingt pieds (20') dans les lots 3 et 4.

ATTENDU que l'échantillonnage produit au cours de ces travaux a été l'objet de nombreuses analyses de laboratoire et de deux études de plan pilot, dont la dernière faite par le docteur Pelletier sur la métallurgie extractive fait partie du rapport N° 424 Ministère des Richesses Naturelles;

ATTENDU que dans la poursuite de ces travaux, la compagnie s'est faite le promoteur d'une route raccordant le quai de Kégashka jusqu'au lot 3 de ladite propriété;

ATTENDU qu'à un endroit situé aux limites des lots 1 et 2, un dépôt de minéraux lourds de très haute qualité minéralogique a été découvert, lequel dans les analyses et les études est identifié Bradleys Cove ou Iron Bay, et qu'à cet endroit le sol est constitué de près de 75% de minéraux lourds, soit, en poids, au-delà de 20% de magnétite, contenant 70.3% de fer, 33% d'ilménite, du grenat en pureté commerciale, du zircon en proportion de 1.7% ainsi qu'une certaine quantité de rutile dont l'évaluation est présentement en cours;

ATTENDU que dans la région des lots 3 et 4, nommée Oyster Point pour fins d'exploration, un échantillonnage jusqu'à vingt-pieds (20') de profondeur a été effectué, et qu'à cet endroit la magnétite en poids est d'environ 25%, contenant 67.5% de fer, ilménite en poids 18.5%, contenant 45.3% de fer avec également présence de grenat, zircon et rutile;

ATTENDU qu'en face des lots 5 et 6 dans la baie Kégashka, des forages sous-marins ont été entrepris sous le pavé de glace au cours de l'hiver 1963-64, laquelle exploration sera continuée au cours de l'hiver prochain;

ATTENDU que relativement aux propriétés ci-haut, à leur exploration et aux travaux préliminaires à leur développement, la Partie de Seconde Part a dépensé une somme jusqu'ici non inférieure à $10,000.00;

ATTENDU que la Partie de Première Part a déjà cédé et transporté à la Partie de Seconde Part tous ses droits, titres et intérêts, tant à la surface qu'aux mines, sur et dans les lots de grève et en eau profonde 4 et 5 du canton Letellier, comté Duplessis;

ATTENDU que ces propriétés font partie de l'ensemble des gites de la compagnie et constituent une source vitale de minerais, dans le cadre de ses projets d'exploitation suivant les procédés mis à point dans son usine de séparation magnétique sise sur le permis à long terme ci-dessus mentionné;

ATTENDU qu'il est bien équitable que la Partie de Seconde Part soit assurée d'une tenure en ce qui a trait aux dépôts non consolidés contenus dans les lots 1 à 6 susdits qui coincide avec celle du permis à long terme N° 27249: Les présentes font foi et les parties conviennent comme suit:

La Partie de Première Part accorde à la Partie de Seconde Part, à compter de la signature des présentes jusqu'au 31 décembre 1975, le droit d'exploiter les minéraux lourds pouvant se trouver en dépôts non consolidés sur les lots 1, 2, 3, 4, 5, 6, rang 1, canton Musquarro (Duplessis).

Conformément aux dispositions du dernier paragraphe de l'entente originale du 20 janvier 1961, pour toute tonne de concentré que la Partie de Seconde Part prélèvera des dépôts non consolidés sis sur les immeubles précédemment décrits, la Partie de Seconde Part paiera une royauté de $0.25 par tonne au cours de ladite période. Le produit annuel de cette royauté sera déposé entre les mains d'une compagnie de fiducie choisie, d'un commun accord entre les parties, en vue d'être appliqué contre le prix d'achat éventuel de la propriété par la Partie de Seconde Part de la Partie de Première Part, conformément aux termes et conditions de l'article 3 de l'entente originale du 20 janvier 1961 annexé aux présentes comme appendice "A".

Toutefois, il sera loisible à la Partie de Première Part de vendre en bloc la susdite propriété, sujet aux droits et sans préjudice aux droits pour la Partie de Seconde Part, de miner, exploiter les dépôts non consolidés suivant les conditions contenues au paragraphe précédent. Cependant, la Partie de Première Part devra, au préalable, offrir à la Partie de Seconde Part lesdits lots et la Partie de Seconde Part aura l'occasion d'acquérir ces derniers conformément aux dispositions de l'article 3 de l'entente originale du 20 janvier 1961 annexée aux présentes comme appendice "A".

Advenant que la Partie de Seconde Part préfère ne pas se porter acquéreur desdits lots, elle pourra continuer son exploitation en payant la royauté de $0.25 la tonne au nouvel acquéreur, et que les sommes accumulées à la compagnie de fiducie seront alors remises à la Partie de Seconde Part en considération des améliorations qu'elle aura fait à la propriété au cours de son exploitation, précédemment à la vente à un tiers.

Si d'autre part la Partie de Seconde Part extrayait, avant la période d'expiration de la présente convention, la totalité des minéraux lourds contenus dans les dépôts non consolidés des lots 1 à 6 susdits, la présente convention prendrait alors fin à compter de la fin de telle exploitation, à moins que la Partie de Seconde Part n'ait acquis ladite propriété conformément aux dispositions de l'article 3 de l'entente originale du 20 janvier 1961 annexée comme appendice "A" à la présente convention, et dans tel cas, les fonds accumulés à la compagnie de fiducie deviendront la propriété de la Partie de Première Part en compensation de la diminution de valeur de la propriété par suite de l'exploitation des minéraux lourds qui en constitue sa valeur principale.

La Partie de Seconde Part paiera au gouvernement provincial toutes les rentes qui pourraient devenir exigibles relativement à l'exploitation desdits dépôts non consolidés, ainsi que toutes les taxes municipales et scolaires ou autres impositions pouvant affecter les susdits lots 1, 2, 3, 4, 5, 6 du rang 1, canton Musquarro (Duplessis) pendant toute la durée de la présente convention. Elle renonce à tout recours contre la Partie de Première Part, même au cas d'éviction résultant de l'application de quelque disposition de la loi.

Signé à Québec, ce Troisième jour de juillet mil neuf cent soixante-quatre.

Emile Amard
Témoin

PARTIE DE PREMIERE PART

PARTIE DE SECONDE PART

MINES-METALLURGIES-KEBEC Inc.

Président

Roland Grasson
Témoin

Vice-Président

CANADA
PROVINCE DE QUEBEC
DISTRICT DE QUEBEC

Je, soussigné, EMILE SIMARD, déclare sous serment

Je suis l'un des témoins susnommés;

Je connais bien M. JOS.-LEON COTE qui a signé le document ci-dessus en ma présence et en présence de l'autre témoin;

Ledit M. JOS.-LEON COTE est majeur et n'est frappé d'aucune incapacité civile.

Et j'ai signé. Emile Simard

Assermenté devant moi à Québec, ce 30 juillet 1964.

O. Klisman

* * * * * * * * *

CANADA
PROVINCE DE QUEBEC
DISTRICT DE QUEBEC

Je, soussigné, ROLAND GIASSON, déclare sous serment

Je suis l'un des témoins susnommés;

Je connais bien M. BENOIT JONCAS et le Brigadier PAUL TRIQUET qui ont signé le document ci-dessus en ma présence et en présence de l'autre témoin;

Lesdits BENOIT JONCAS et PAUL TRIQUET sont majeurs et ne sont frappés d'aucune incapacité civile.

Et j'ai signé.

Assermenté devant moi à Québec, ce 30 juillet 1964.

CONTRAT DE VENTE exécuté à Québec, ce seizième jour de mars mil neuf cent soixante-cinq.

ENTRE

Monsieur Atthur Massé, demeurant à 350 Boul. Charest Est, Québec,
ci-après appelé: " LE VENDEUR "

ET

MINE S-METALLURGIES-KEBEC Inc. (No personal liability) une compagnie incorporée par lettres patentes en vertu de la loi des compagnies minières du Québec, ici agissant et représentée par M. Benoît Joncas, son président, dûment autorisé en vertu des règlements ci-après appelée: " LA COMPAGNIE "

LESQUELLES PARTIES déclarent ce qui suit:

LE VENDEUR déclare avoir vendu, cédé et transporté, comme par les présentes il vend, cède et transporte à la Compagnie qui accepte, quinze (15) claims miniers transférés à son nom au Ministère des Richesses Naturelles du Québec, tel qu'il apparaît à l'endos des certificats de mineurs, claims établis pour des substances définies de l'article 85 de la loi des Mines, et situés dans les cantons Duval, Kégashka et Masquaro, Comté de Duplessis, sur la Côte Nord du Fleuve St-Laurent, lesquels claims peuvent être plus spécifiquement décrits comme suit:

DESCRIPTION des CLAIMS

No. 216632, cl.1

Un claim de 1280 acres app. situé à l'est du lot 34, tel que jalonné le 19 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

No. 216634, cl.1

Un claim de 1280 acres app. situé au nord-est du lot 34, tel que jalonné le 19 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

No. 218907, cls 1 & 2

Deux claims de 880 et 320 acres app. situé au nord des lots 33 et 34 (Cl. 1) situé à environ $\frac{1}{2}$ mille à l'ouest de la rivière Kégashka à la limite sud du canton, (Cl. 2) tel que jalonné le 19 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

No. 219365, cl. 1

Un claim de 1280 acres app. situé à environ un mille au nord des lots 29 & 30, tel que jalonné le 19 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

No. 219366, cl. 1

Un claim de 1280 acres app. situé dans le coin sud-est du canton, tel que jalonné le 17 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis, (Que).

No. 219367, cls 1 à 3

Trois claims de 280, 350, et 500 acres app. tel que jalonnés le 17 octobre 1964, dans le lit du Golfe St-Laurent et la grève en front des lots 1-2- du rang 1, (Cl. 1) dans le lit du Golfe St-Laurent et la grève en front des lots 3,4,5 et Bloc "A" du rang 1, (Cl. 2) dans le lit du Golfe St-Laurent et la baie de Kégashka et grève en front du lot 6 à l'est du bloc "A" et une partie non-subdivisée (Cl. 3) canton Musquaro, District Electoral de Duplessis (Que).

No. 219368, cl. 1

Un claim de 1280 acres app. situé à deux milles à l'est de la première chute de la rivière Natashquan, tel que jalonné le 20 octobre 1964, dan la partie non-subdivisée du canton Duval, District Electoral de Duplessis (Que).

No. 219369, cl. 1

Un claim de 1280 acres app. situé à environ à un mille au nord des lots 23 à 26 et un mille à l'est de la rivière Natashquan, tel que jalonné le 20 octobre 1964, dans la partie non-subdivisée des cantons Duval et Kégashka, District Electoral de Duplessis (Que).

No. 219370, cl.1

Un claim de 1280 acres app. situé au nord des lots 31 et 32, tel que jalonné le 19 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

No. 219371, cl.1

Un claim de 1280 acres app. situé à enviroh deux milles au nord des lots 27 et 28, tel que jalonné le 19 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

No. 219372, cl. 1

Un claim de 1280 acres app. situé à l'est de la première chute de la rivière Natashquan, tel que jalonné le 20 octobre 1964 dans la partie non-subdivisée du canton Duval, District Electoral de Duplessis (Que).

No. 219373, cl.1

Un claim de 1280 acres app. comprenant une partie du lit de la rivière Natashquan, de l'île No. 1 et de l'île No. 2, 3, situé au sud de la première chute de la dite rivière, tel que jalonné le 20 octobre 1964, dans la partie non-subdivisée des cantons Duval et Natashquan, District Electoral de Duplessis (Que).

No. 219374, cl. 1

Un claim de 1200 acres app. situé au nord des lots 20, 21, et 22, tel que jalonné le 20 octobre 1964, dans la partie non-subdivisée du canton Duval , District Electoral de Duplessis (Que).

No. 219375, cl. 1

Un claim de 1280 acres app. situé à environ deux milles au nord des lots 25, 26, tel que jalonné le 20 octobre 1964, dans la partie non-subdivisée des cantons Duval & Kégashka, District Electoral de Duplessis (Que).

No. 219376, cl.1

Un claim de 1280 acres app. situé à l'embouchure de la rivière Kégashka, incluant partie du Hâvre de Kégashka, à distraire le lot 1, tel que jalonné le 17 octobre 1964, dans la partie non-subdivisée du canton Kégashka, District Electoral de Duplessis (Que).

A la suite des présentes, la Compagnie Acquéreur deviendra propriétaire absolu des dits claims miniers contenus aux certificats avec possession immédiate.

CONSIDERATION

La présente vente des transports est faite pour et en considération de la somme de CINQ CENTS DOLLARS ($500.00), ainsi que toutes autres bonnes et valables conditions, que le vendeur déclare avoir reçue ce jour, dont quittance.

EN FOI DE QUOI le présent acte de vente a été exécuté en présence de témoins à Québec à la date plus haut mentionnée.

" LE VENDEUR "

Roland Giasson — Arthur Massé
Témoin — Arthur Massé

MINES-METALLURGIES-KEBEC Inc.
(no personal liability)

Témoin — Pres.

Je .....Roland Giasson.....de.....Sillery.....

comté de .....Québec.....étant dûment assermenté, dépose et dit:

1.- je suis le témoin signataire de l'acte de transport consenti par Arthur Massé en faveur de MINES-METALLURGIES-KE BEC Inc.

2.- Je connais le cédant et je certifie qu'il a signé le dit transport en ma présence.

Roland Giasson
Signature du témoin

Assermenté devant moi à:.....Québec.....

Ce...dix-septième.....jour de.....mars.....1965.....

Paul M Germain
Signature et Titre

Commissaire de la Cour Supérieure, District de Québec
Commissioner of the Superior Court, Quebec District