GM 20531

GEOLOGICAL AND RADIOMETRIC SURVEYS

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NEW FAR NORTH EXPLORATION LIMITED

Johan-Beetz Area, Saguenay County
P.Q.

GEOLOGICAL & RADIOMETRIC SURVEYS

by

J.R. Mowat & Associates Ltd.

Ottawa, Canada

July 21, 1967

PUBLIC

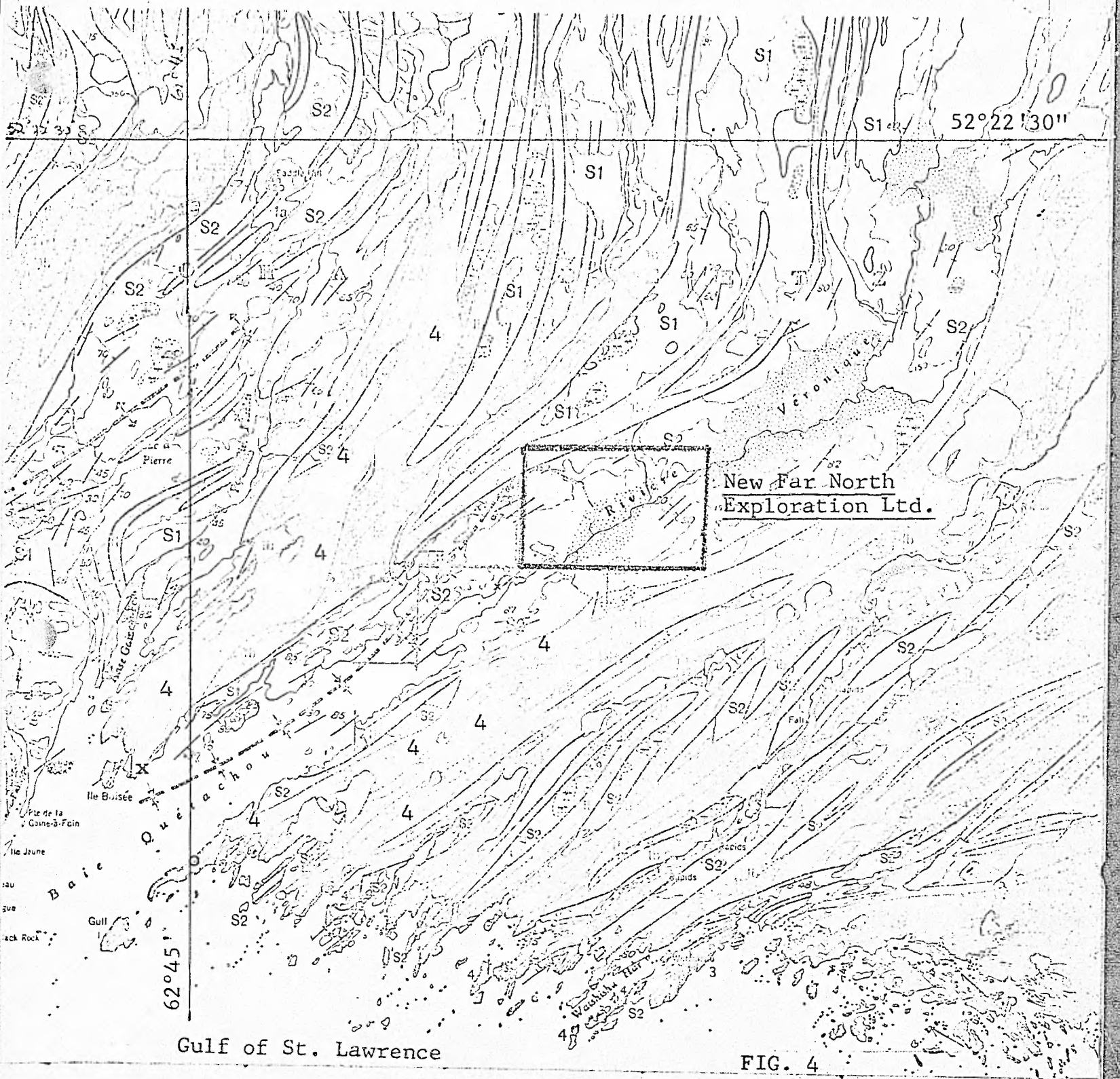

FIG. 4

PUBLIC

Ministère des Richesses Naturelles, Québec

SERVICE DES CITES MINÉRAUX

No GM- 20591

NEW FAR NORTH EXPLORATION LIMITED

LOCATIONAL PLAN

Scale: 1" = 1 mile

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INTRODUCTION

The following report is based on field surveys of the property and available government data on the area. The field work was completed during the period of June 20th to July 8th, 1967 by D.L. Wetmore, with the assistance of C. and L. Gallant.

A picket line grid with a two-hundred (200) foot line spacing and a one-hundred (100) foot station interval was cut on the property to provide the necessary control for the surveys. The baseline and picket lines are orientated astronomically at 058° and 148° respectively.

With the above established control, a geological map of the property was compiled on a scale of one inch to two-hundred (200) feet. Contemporaneous to the mapping project a three channel scintillometer survey was completed. The relative energy levels of gamma ray emmission of potasium, uranium and thorium were recorded at each one-hundred foot station along the grid. The plans encompassing the results of both surveys are appended. The property comprises a total of 26.0 miles of picket lines.

CONCLUSIONS & RECOMMENDATIONS

The main rock types underlying the property are impure quartzite and amphibolite gneiss, neither of these types is considered a favourable host for uranium minerals in this area. Pegmatite dykes where encountered, were poorly developed and too limited in extent to be considered favourable host rocks. This conclusion is supported by the results of the scintillometer survey where background values were not exceeded to any extent, and values on the three respective channels were consistantly low.

Under the circumstances we recommend that no further exploration be undertaken on the property at this time, but that the claims be held in good standing, by virtue of the work credit developed, pending results from other developers now working in the area.

PROPERTY

The New Far North Exploration Limited property consists of a continuous group of twenty-four (24) unpatented mining claims located in the Johan-Beetz Twp., Saguenay County, Quebec - numbered as follows:

263267	2	to 5	inclusive
263268	1	to 5	inclusive
263269	1	to 5	inclusive
263270	1	to 5	inclusive
263271	1	to 5	inclusive

The claims are less than regulation size. The claim group contains approximately 590 acres.

LOCATION and ACCESSIBILITY

The property is located immediately to the north-east of Quetachou Bay, Saguenay County, P.Q. (latitude 50°19'N; longitude 62°41'W).

Johan-Beetz is a small settlement 440 miles east of Quebec City and 165 miles east of Sept Iles. In summer the area may be reached by regularly scheduled, float-equipped aircraft from Havre St. Pierre, a distance of 34 miles west of Johan-Beetz; or, by boats of the Clarke Steamship Company Limited which make regular stops. Havre St. Pierre is serviced by DC-3 aircraft of Quebecair from Sept Iles; Air Canada and Quebecair connect Sept Iles to Quebec City and points west. A winter road from Havre St. Pierre crosses the south-west corner of the property.

SERVICES, TIMBER and WATER

The settlement of Johan-Beetz derives electricity from diesel-powered generators operated by Hydro Quebec. Any future mining venture would require this mode of local power generation, or the transmission of power from existing facilities at Havre St. Pierre, dependant upon the scale of operation.

Spruce, balsam and poplar are the predominant types of trees in the area. Generally the trees are of the scrub variety due to

the strong inland winds from the Gulf. Only a limited quantity of timber suitable for mining purposes might be obtained from the valleys bordering nearby rivers and lakes.

Local rivers and lakes could supply an abundance of readily available fresh water for all requirements.

PHYSIOGRAPHY

The land in the Johan-Beetz area rises gently from sea-level to the northward. The highest points, slightly in excess of 600 feet, are located along the east side of Piashti Lake, a distance of approximately 15 miles north-west of the property. The type and structure of the underlying rock controls the form of the land and coastline.

In the vicinity of the property, long narrow ridges and valleys alternate. The coastline is very irregular with numerous bays and peninsulas. The strike of this ridge and valley topography is concordant with that of the underlying metasedimentary and basic intrusive rocks characteristic to the area. Generally the ridges are underlain by the more resistant gabbro or gabbro-injected quartzite rock types.

Northwest of Johan-Beetz the topography is in the form of a gently undulating plateau that slopes southward to the Gulf. The coastline is generally regular and smooth. Granite and its derivatives underly this area.

Drainage, although not well developed, is directly southward to the Gulf. Although many smaller streams discharge directly into the Gulf, Cooper (1957) has outlined four main drainage basins consisting of interconnected lakes and rivers as follows:

(1) Corneille river; draining Traverse, Ferland, Turgeon and Tanguay lakes and several small lakes which flow

(2) Petite Piashti river; draining Piashti, Petit Piashti and Sale lakes

(3) Quetachou river; draining Napoleon and Bellanger lakes, as well as Cabane-Brulee lake and numerous small lakes emptying into it.

(4) Watshishou river and its west tributary; draining Theobule and Cabane-Neuve lakes.

The lakes are generally elongated parallel to the strike of the underlying formations. Generally they occupy depressions formed by selective erosion along the line of contact between quartzite and gabbro, or, in the granite plateau, broad basins. Numerous small lakes fill low areas in the gabbro ridges and quartzite hills. Rivers and small streams are commonly located in the valleys of the areas underlain by the less resistant quartzites.

REGIONAL GEOLOGY

Table of Formations (from G.E. Cooper, 1957, p.9)

Cenozoic:	Clay, sand, gravel, erratic boulders
	Great Unconformity
Precambrian:	-Pegmatite
	-Biotite Granite
	-Gneissic Granite and older Pegmatite
	-Uralite Gabbro and Amphibolite Derivatives
	Intrusive Contact
	-Migmatites
	-Micaeous Quartzite, Quartz-Biotite Schist, Quartz-Biotite Gneiss
	-Grey Quartzite - impure, calcareous

The consolidated rocks of the area are all Precambrian in age. The oldest formations are metamorphosed sediments grading from impure quartzite to biotite schist. Locally the metasediments have been transformed into migmatite. A series of long,

tabular, sill-like bodies of altered gabbro have intruded the metasediments. Gneissic granite, containing inclusions of the older quartzite and gabbro, intrudes the metasedimentary rocks adjacent to the Gulf immediately to the west of Baie Johan-Beetz. The granite gneiss is in turn cut by a younger, medium-grained, generally massive granite. The youngest rocks of the area are comprised of dykes and sills of pegmatite that intrude all older formations.

The general structural trend of the rocks of the area is manifested in the sills and dykes of gabbro as shown on the regional geological map. In the north, the formations trend north-south. The trend changes abruptly to the southwest in the central to southern part of the map area. South of the main granite mass the trend is almost east-west. Locally cross-bedding and ripple marks indicate the direction of tops in the metasedimentary formations.

The gabbro and metasediments have been sheared in the southern part of the area. Jointing is common to each of the rock types. No definite evidence of faulting has been indicated.

Folding has been relatively intense in subject area. Cooper (1957) has inferred several anticlinal and synclinal structures. As outlined in his report, some of the structures have been overturned and plunge at various angles along their strike.

Schistosity has been well-developed in the mica-rich metasediments particularly in the southern part of the area. The schistosity is generally parallel to its bedding and to the more resistant grey quartzite. The gabbro in the southern areas illustrates a poorly developed schistosity. Locally the shearing is more intense and has transformed the rock to biotite and amphibole schist. The strike of the schistosity is parallel to the strike of the sills and to the enclosing metasedimentary rocks. Deformation of the gabbro during the intrusion of the granite is believed to have caused this latter schistosity.

GEOLOGY OF PROPERTY

Rock Types

By far the most prolithic rock-type encountered on subject property is a light grey impure quartzite. Minor facies changes have resulted in the formation of what may be termed limey quartzite and micaeous quartzite.

The principal impure quartzite is a light grey, hard, tough, medium-to fine-grained rock. The fracture is sub-conchoidal and appears to be dependant upon the degrees of recrystallization of the original rock. Cooper (1957) has described this rock-type as illustrating primary bedding and locally ripple marks and cross bedding. Writer believes that although the original quartzite showed primary bedding that the present "gneissic" appearance of this rock is due largely to the attendant alteration and recrystallization accompanying the complex folding of the area.

The general mineralogical composition as determined by Cooper is as follows:

Quartz	60-70 per cent
Feldspar	4-20 per cent
Biotite	2-10 per cent
Muscovite	8-13 per cent
Amphibole	accessory to 20 per cent
Magnetite	accessory to 8 per cent
Accessories	carbonate, apatite, tourmaline, sphene, epidote, garnet, rutile, pyrite, scapolite (near contact with gabbro)

Locally the quartzite has a baked appearance. In these areas the quartzite is more compact with the outline of individual grains being obscured. Epidote is more prevalent in these localities.

Near surface the grey quartzite is commonly lighter in appearance. Leaching has removed many of the iron oxides in solution. Commonly the breakdown of the carbonate and feldspathic constituents have freed grains of quartz imparting a more granular texture to the rock.

The calcareous quartzite has limited areal extent. It is extremely difficult to trace this rock type in either the lateral or strike directions owing to the discontinuous nature of this rock type and the masking effect of the overburden.

Cooper has described good exposures of the calcareous quartzite as occurring in beds of up to three feet in thickness. He describes the average mineralogical composition as follows:

Quartz	30-60 per cent
Carbonate	12-25 per cent
Feldspar	5-30 per cent
Biotite	10-20 per cent
Muscovite	5-8 per cent
Magnetite	accessory to 4 per cent
Accessories	epidote, apatite, and to a lesser extent, sphene, zircon and tourmaline

The weathered surface of the rock presents an uneven to pitted appearance due to solutioning of the carbonate.

The micaeous quartzite is essentially the same rock type as the grey quartzite with a higher percentage of mica. Generally the muscovite variety of mica was encountered on the property. The muscovite is commonly orientated parallel to the bedding of the rock.

The similarity of the three types of quartzite, their discontinuous nature, and the relatively low percentage of continuous outcrop exposure did not permit the differentiation of the three types during the mapping project.

A sill of altered amphibolite gneiss intrudes the metasedimentary rocks along the south-eastern portion of the property. The gneiss contains aggregates of elongated crystals of amphibole - predominately horneblende (60 per cent), aggregates of plagioclase (30 per cent), and biotite (10 per cent). The bordering phases of the sill are somewhat smaller in grain size and contain crystals of quartz probably assimilated from the quartzitic host rocks. The sill appears to vary in thickness from 50 feet at its widest point to slightly in excess of 15 feet. Overburden conditions would not permit tracing the sill more than 500 feet along strike nor defining its exact boundaries. It appears, however, to be subconcordant to the bedding of the quartzites.

A limited number of intrusions of pegmatite were encountered during the mapping. Generally the intrusions consisted of

medium-grained dykes of pegmatite in the order of three to five inches wide cutting sub-perpendicular across the bedding of the quartzites. Locally the pegmatites pinched and swelled and cut irregularly across the metasediments, probably along lines of pre-existing weakness in the host rocks.

Quartz and potash-albite feldspars are the essential constituents of these pegmatites. Lesser amounts of mica (biotite and muscovite), horneblende, magnetite, garnet, and galena were discernable. Clearly defined chilled-edge contacts were observed between the pegmatite and quartzite on all occasions.

Structural

A systemmatic determination of the attitude of the quartzite formations reveals, in conjunction with Cooper's regional geological mapping, that the property is located on the south-eastern flank of the Quetachou Bay syncline, Although minor irregularities and contortions are observable, the bedding of the quartzites strikes north-east and dips steeply to the north-west. The strike in the north-east portions of the property appears to be assuming a more northerly direction.

At numerous locations on subject property small (¼ to ½ inch wide) quartz stringers were observed to fill fractures in the quartzite. The predominant strike of the stringers is 130° - sub-perpendicular to the strike of the quartzites. Additionally, several small pegmatitic dyklets were seen to have a similar strike to the quartz stringers. It is assumed, therefore, that the quartz and pegmatite solutions intruded tension fractures resulting from the forces creating the folding in the area.

Along the south shore of Veronique River from lines 56+00 E to 76+00 E a prominent drop estimated to be 85 feet vertically occurs towards the river. A fault may be indicated, however, no evidence to support this was observed in the field. Differential glacial erosion may have caused this feature, particularly in view of the presence of calcareous quartzite in this vicinity.

Economic

As outlined in the qualifying report on subject property, the economic potential of the New Far North claims was stated to be closely related to the possible presence of pegmatic

intrusions which might host, or provide the source of, uranium-bearing solutions. These favourable pegmatite host rocks are not exposed on subject claims other than as small, irregular dykelets of rudimentary size. Similarly, no anomalous scintillometer readings indicative of a source of significantly higher than background gamma radiation were obtained.

SCINTILLOMETER SURVEY

Theory of TV-3 Scintillometer (McPhar)

There are two main types of radiation detectors, the geiger counter and the scintillometer.

The detector in the geiger counter is a gas filled tube. Radiation particles entering the tube collide with gas atoms causing ionization which in turn creates an electrical pulse in the associated circuit. The detector in a scintillometer of the type used in subject survey, (McPhar TV-3), is a solid crystal and is more efficient, being a thallium activated sodium iodide type. Radiation particles entering the crystal collide with the crystal atoms. When a collision occurs a flash of light is generated. The light energy is amplified in a matched photo-multiplier.tube and converted into an electrical current pulse. These collisions generate an electrical output that can be readily measured.

Of the three types of energy radiation from uranium; alpha, beta and gamma, the gamma particles have the highest energy. Because gamma rays are higher energy particles they travel far-thest from the source before being attenuated. Gamma rays are generally described as high energy particles and the energy level is more specifically described in terms of electron volts. Characteristically, different radioactive materials give off gamma rays having particular energy levels. For example: gamma rays from potassium have an energy level of 1.46 Mev.; uranium 1.76 Mev. and thorium 2.62 Mev. The above elements occur in nature with varying abundance. In addition to radiation from these sources there is background radiation from cosmic sources and radioactive fallout.

The scintillometer crystal and photomultiplier will register an electrical output from any of these sources. There is one distinguishing feature, however, the magnitude of the electrical pulse resulting from a collision will bear a direct relationship to the energy level of the particle involved in the collision. The electrical pulse height resulting from a particle collision

at the thorium energy level of 2.62 Mev. will be approximately twice that of one from potassium at the 1.46 Mev. energy level.

The readout circuits, following the photomultiplier, are designed in such a way that a pulse exceeding a given height or threshold level will be passed, while one of a lower amplitude will not be passed. It is then possible to read only the radiation of thorium in the presence of both potassium and uranium. This is the principle employed in the scintillometer employed in your survey. It is a variable threshold instrument with 3 fixed and predetermined threshold positions. Threshold 1 blocks all radiation below the energy level of potassium but registers radiation arizing from potassium, uranium and thorium. Threshold 2 blocks all radiation below the level of uranium and thorium. Finally, to determine the relative contribution between uranium and thorium, threshold 3 passes only the radiation at the thorium energy level.

Scope

McPhar's Model TV-3 Scintillometer was used to complete the survey. The threshold levels of potassium, uranium and thorium were determined daily by calibration to ensure optimum instrument efficiency and uniformity. Duirnal and day-to-day variations in the energy level of the three types of radiation were minimized by using control stations established along the baseline.

The energy levels of gamma ray emmission of potassium, uranium and thorium were measured at each one-hundred foot station along the picket lines. The values for each element are plotted on a scale of one inch to two-hundred feet and expressed thereon as a computed reading in counts per minute ($Mr \times 10^{-1}$). Geological and scintillometer plans are appended to this report.

Discussion of Results

The scintillometer readings of the potassium, uranium and thorium energy levels do not show sufficiently anamalous fluxuations to outline any area on the property that might indicate a source of higher than background radiation. It may be noted

however that the background readings over areas of quartzite outcrop are in the order of two to three times the background of areas covered by overburden. Similarly, test profiles run over areas on medium-to coarse-grained granite in the Baie Johan-Beetz area indicate four and a half to five times background as compared to the overburden-covered areas on subject property.

Respectfully submitted,

D.L. Wetmore, G.E.I.T.

J.R. Mowat, P. Eng.

mm
Ottawa, Ontario
July 21, 1967

CERTIFICATE

I, James Rodman Mowat, do hereby certify that:

1. I am a consulting geologist practising under the name and style of J.R. Mowat & Associates with residence at 35 Aleutian Road, Ottawa 6, Ontario, and offices at 721-56 Sparks Street, Ottawa 4, Ontario.

2. I am a Bachelor of Science in Arts, University of New Brunswick, 1948.

3. I have practised my profession for more than 19 years, during which time I have been in responsible management positions for 16 years.

4. I hold current memberships in the following associations:

   Member - Canadian Institute of Mining & Metallurgy
   Fellow - Geological Association of Canada
   Member - Association of Professional Engineers, Manitoba

5. This report has been prepared for a specified contractural fee on completion thereof, and no other advantage to the undersigned is known or anticipated. I have no interest direct, indirect or anticipated in the properties or securities of New Far North Exploration Limited.

6. This certificate is part of the attached report on the Geological & Radiometric Surveys of New Far North Exploration Limited, Johan-Beetz Area, Saguenay County, P.Q.

7. This report is based on:
   1. Personal supervision of field work by professional persons on my staff.
   2. Examination of available Governmental and Past Development records.
   3. Full cognizance of the facts.

Signed at Ottawa in
the County of Carleton,
this 21st day of July, 1967.

J.R. Mowat

J. R. MOWAT & ASSOCIATES LTD.

Exploration Consultants

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July 21,1967.

Mr. Sam Taylor, Sec.-Treas.,
New Far North Exploration Limited,
Suite 1024 - 85 Richmond St. West,
Toronto, Ontario.

Dear Mr. Taylor;

We attach herewith our report on the results of the Geological - Radiometric surveys on your Baie Johan-Beetz holdings, Saguenay County, Quebec.

The report has been made up in seven copies for distribution by your office as follows:

2 copies to New Far North Exploration Limited
2 copies to Quebec Dept. of Mines (assessment work)
2 copies to Government and Exchange Commissions
1 copy our file

Please note that the claims making up your holdings are considerably smaller than average. The work involved approximately 26 miles of survey line instead of the predicted 40. The cost of the surveys to New Far North has been reduced accordingly, taking into consideration a small increase in our fixed costs of mobilization, report compilation and reproduction as a result of reduced mileage. We trust you will find all in order.

We very much regret that the results of the survey, in our opinion, do not justify followup work on the property. May we take this opportunity to thank you for this work and hope to be of service in the future.

Yours very truly,

J.R. Mowat

JRM:mm