31L13SE0004 63.785 FLETT

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November 29th, 1956

Mr. S.J. Mason,
Mining Recorder,
HAILEYBURY, Ontario

Dear Mr. Mason -

I enclose herewith Certificates of Work, together with Engineer's drawings and Reports on eighty-five (85) claims in Flett Township, District of Temiskaming, to be filed for assessment work.

Will you please acknowledge the receipt of these reports.

63.785

MINING CLAIM NUMBERS:

T-34540	T-34728	T-34786	T-34834	T-35589
T-34541	T-34729	T-34787	T-34835	T-35590
T-34542	T-34730	T-34788		T-35591
T-34543	T-34731	T-34789		T-35592
T-34544	T-34732	T-34790		T-35593
T-34545	T-34733	T-34791		T-35594
T-34546	T-34734	T-34792		T-35595
T-34547	T-34735	T-34793		T-35596
T-34548	T-34736	T-34794		T-35597
T-34549	T-34737	T-34795		T-35598
T-34550	T-34738	T-34796		T-35599
T-34551	T-34739	T-34797		T-35600
T-34552	T-34740	T-34798		T-35601
T-34553	T-34741	T-34799		T-35602
T-34554	T-34742	T-34800		T-35603
	T-34743	T-34801		T-35604
	T-34744	T-34802		T-35605
	T-34745	T-34803		T-35606
	T-34746	T-34804		T-35607
	T-34747	T-34805		T-35608
	T-34748	T-34806		
		T-34807		
		T-34808		
		T-34809		
		T-34810		
		T-34811		
		T-34812		

ob

In respect to Claims #35589 to 35608 inclusive (lined in red in my letter), a diamond drill crew is on these claims and will file by December 7th, the due date, sufficient work to bring these claims to the total of 80 days required.

We are sending you, under separate cover, the engineer's maps and report, the original of which are being delivered to the Department here at Toronto.

When this work is recorded may I have new abstracts of title prepared, and, if you will notify me the charge I will send you a cheque to cover.

Yours very truly,

C.L. Murray

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encls.

Content

Contents (Cont.)

Note : There is no page 9 or page 10 in the report.

Scientific Prospecting And Development Engineers
OPERATED BY
Johns MINERAL SURVEYS Limited
"WE DO THE S.P.A.D.E. WORK"

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BIRNHAVEN, ONTARIO
TORONTO METRO
PHONE AM. 1—1594

ORE-DEPOSIT
INTERPRETATIONS
BASED ON
GEOLOGICAL
FACTS ONLY

November 27 1956

Mr. J. J. Gray,
80 Richmond Street West,
TORONTO, Ontario.

Report on Petrological and Mineralogical Investigation of Claims T-34540 to T-34554 (incl.), T-34728 to T-34748, (incl.) T-34786 to T-34812 (incl.), T-34834, T-34835, T-35589 to T-35608 (inclusive) in Flett Township, District of Temiskaming, Ontario.

Recommendations.

It is evident that there is no orebody of commercial proportions which outcrops at the present surface.

If it is desired to search farther for Titanium-iron deposits then the base of the Amphibole-Mica member on the west of the basic body should be investigated. A magnetometer survey, followed by drilling, would be the best means of making this investigation.

As there is evidence of gravitational separation within the basic body, there is a possibility of a separation of heavy iron oxides and metallic sulphides at the base of the formation. This base is not exposed and there is no way, except drilling, to determine the depth to the base.

The favorable horizon for Titanium concentration has been eroded off of the eastern and northeastern part of the basic rock on the property.

There is no indication of any hydrothermal activity within the granitic gneisses which could be associated with an hydrothermal ore deposit.

Exploratory drilling to determine the depth to the base of the layered formation would appear to be the most likely means of eventually leading to a commercial orebody on the property.

Conclusion

The basic intrusive on the property is separated into layers by gravitational settling. In this respect it resembles the Bushveldt Complex of South Africa and several other occurrences in various parts of the world. Many of these occurrences have layers of valuable minerals such as chrome, platinum, copper and nickel. There is practically no indication of the presence of these valuable layers by examining the other layers.

The same could be said for the basic intrusive on your property. The layers now exposed show no evidence of any ore concentration at the present surface but the possibilities of the property will not be exhausted until the lower layers, not exposed, are probed.

Location of the property.

The property, ClaimsT-34540 to T-34554, T-34748 to T-34748, T-34786 to T-34812, T-34834, T-34835, T-35589 to T-35603, all inclusive, are located in the eastern half of Flett township, Temiskaming Mining Division, Ontario.

Claim T-35805 joins on to the mutual boundary of Flett and Angus townships.

Access.

The north end of the property can be reached by light, float plane landing on Mackenzie lake. The southern part of the property can be reached by very light, float plane landing on Fanny lake. The presence of log booms is a hazard. There is report of aircraft landing in winter on the ice of Broadalbane and McDairmid lake but these are too small for summer landings.

A good logging road runs 14 miles from Kenney siding on the Ontario Northland railway to Fanny and McKenzie lakes. Numerous old skid roads cover much of the property but are heavily overgrown.

Topography

Low, flat-topped hills occur throughout the property. There is a heavy mantle of vegetable matter and debris from logging. Forest growth is profuse. The main outcrops of bare rock are on the sides of ledges and do not show well on a plan map. On the tops of the hills it is necessary to dig through the debris to find rock.

There are extensive sand plains and boulder morraine deposits.

Sampling

A basic spacing of 400 feet was used for the traverses. Sampling started off at 200 feet but, as the invariant nature of the rock types became evident, was increased to nearer 400 feet. The spacing had been determined by very close spaced sampling over the known orebody.

Nature of the Investigation.

When an orebody is emplaced in the rock, the ore is carried into place by very hot gases or vapours. The ore minerals are in solution in these vapours. Being very dilute and tenuous, there is an immense volume of vapour required to transport the ore.

An orebody is usually quite large, but the volume of very dilute gas, required to transport that volume of ore, is almost beyond comprehension. Yet this immense volume must have passed through the rocks where the orebody is now found. Transportation into place implies flow, and flow means that there must have been a channelway along which the transporting medium could pass.

The channelway does not necessarily mean an open conduit but merely a path of less resistance to the flow of the aqueous solutions. If there is nothing else more suitable, the solutions will permeate through the solid rock in the line of least resistance, (which may be only the direction of maximum chemical reaction).

The fact that the orebody, (actually a very minor constituent of the great volume of material introduced), is deposited in a certain place,may be result of local factors within the channelway which have caused a change in the chemical equilibrium of the transporting medium and caused the ore minerals to precipitate from solution.

The localization of the orebody may be due to some local structure, or other condition, within the channelway, but, no matter how beautifully that structure or other possible concentrating device may be developed, there can be no ore-deposition unless there has been transportation of the ore into that structure.

Although dilute, the ore-transporting medium is a chemical solution, and will react with the country rock through which the solutions pass, in fact the solutions probably are not driven into the rocks by some outside force but are drawn into the rocks by the strength of the chemical reactions. It is highly improbable that the passage of such a tremendous volume of solutions, as would be necessary to transport even the smallest of commercial orebodies, could have passed through the rocks without leaving some trace of the passage by reacting with the host rock.

As the orebody is only a very small portion of the volume of gases, and as the gases must have penetrated the rocks far beyond the limits of the orebody, the sixe of the alteration "halo" will be many times the size of the orebody. Thus the halo will extend far beyond the boundaries of the ore and will give a much larger target for which to seek.

Where the orebody is under a lake, or overburden the alteration halo is usually large enough to extend to the nearest outcropping of rock.

There have been many attempts made to determine the shape and size, and the very existance, of an alteration halo. Occasionally these attempts have been successful. The main reason why the researchers have failed to show the presence of an alteration halo is that they have almost invariably been looking for an exotic mineral, or collection of minerals, which could be easily distinguished from the common rock-forming minerals.

Any quantitative determinations which were made were usually of some specific element, usually the diagnostic element of the exotic mineral which they were trying to use. The means of quantitative analysis were too inaccurate to give the quantitative relationships of the common rock-forming minerals, or of the elements which make up the common minerals.

With the development of precise instruments for making quantitative analyses of the mineral content of rocks - a development which has taken place since World War II - it has been possible to determine the mineral composition of the rocks with sufficient rapidity that the time element has been reduced to a reasonable amount, and sufficiently economical that precise mineral surveys can be made competitive with other accepted methods of evaluating properties.

Having a method which is economically feasible it was a logical sequence that the vicinity of known ore-deposits should be examined to see whether there was indeed an alteration halo as predicted. Accordingly, examinations were made around the mines of Porcupine, Beatty-Munro, Kirkland Lake, Cobalt, Matatchewan Gowganda, Rouyn, Cadillac, Malartic, ValDOr and Chibougamau. A distinct mineral assemblage was found around every producing orebody.

It is not sufficient to show that distinct mineral assemblages exist around orebodies unless it is also shown that such assemblages do not occur, in size and concentration similar to that around the known ore, in areas where there is no ore. Very large areas, of rock of similar composition to that which surrounds known orebodies, were systematically covered and there was not a single instance were halos of similar size and intensity were found.

As the alteration halo is produced by the ore-transporting medium it follows that there can be no orebody where there is no halo.

Of the mineral occurrences examined in the mining camps mentioned above, in every case, the alteration halo was indicated by a change in the quantitative relationships of the common rock-forming minerals. No new minerals were developed.

The quantitative changes in the amounts of the common minerals, already present in the rock, are such that the quantity of elements making up these minerals could not have been supplied by a rearrangement of the original elements in the rocks. To create the new mineral assemblage, often without displacing the original bedding of the formations, requires the addition of elements from an outside source. These added elements indicate the nature of the ore-transporting medium which is also coming from an outside source.

The evidence, that the ore-transporting mediums are dilute concentrations of sodium, potassium, magnesium, calcium, and iron silicates, or carbonates, or both, in an aqueous gas, varies from one mining area to the next. The most common element so far encountered is sodium. There is considerable potash and magnesium. True addition of calcium is rare. Iron is usually combined with one of the other elements, addition of iron alone being rare. Invariably the cation of these elements is silicate, or, more rarely, carbonate.

Host rocks are invariably made up of some combination of silica, alumina, iron, sodium, calcium, magnesium or potassium, with oxygen, and minor amounts of many other elements.

Thus there is wide variation in both the ore-bearing solutions and the host rocks. It is impossible to predict which mineral assemblage will be diagnostic for any new mineral area. Only widespread analyses will determine, a. the nature of the unaltered host rocks, and b. the nature of the ore-bearing soltions.

Within a single mining area the host rocks may vary but the ore-solutions tend to remain remarkably constant.

The first undertaking, in beginning to work in a new mineral area, is to determine the nature of the alteration around a known ore-deposit, if a known deposit exists.

It is also necessary to determine the size of the alteration halo around a known orebody as the amount of reaction of the ore-bearing solutions, with the country rock, varies from one mining area to another, for one reason because of different solution temperature. Compressibility, permeability, degree of deformation and many other factors also have effect.

The amount of ore which will be carried by solutions is related to the volume of those solutions. If thevolume is halved the amount of ore will be halved, other conditions being equal, but the amount of surface alteration will not be halved. This is because the volume is related to the cube of the radius of the alteration halo. A decrease in volume of solutions, for the same intensity of alteration in the halo, will not produce the same decrease in the radius of the alteration halo.

When examining an area to locate alteration halos, with regard to the size of the halo around the known ore-deposit, we know that, as the size of any new halo decreases, the possibility of that halo enclosing an orebody falls off very rapidly Having found the size and intensity of an halo around a commercial orebody, we have a good indication of the size of halo that we should be looking for. We also know that halos much smaller would be of marginal possibility for ore-deposition.

Field procedure

Although our methods of rock-mineral analysis give quantitative determinations for less cost, by a wide margin, than any other method of analysis of comparable accuracy, there is still a considerable expense involved. It is not possible, both because of expense and time, to take an unlimited number of samples and make an unlimited number of analyses. Our endeavour is to get the maximum amount of information from the minimum number of analyses, without taking a chance of missing any information of economic importance.

For economy of sampling, amongst other reasons, it is necessary to adopt a systematic method of sample collecting. The samples are collected on a grid and the spacing of the grid is governed by the size of the alteration halo around the known deposit. Our experience to date indicates that a spacing of 400 feet, on an equidimensional grid, will be sure of locating the alteration halo around any known orebody, yet will prevent the collection of an unnecessarily large number of samples, and the accumulation of redundent data.

Mapping is done from air photographs enlarged to a scale of 400 feet to the inch. A 400 foot grid is superimposed on the photograph. The field man navigates through the bush until he determines that he is at the exact location of an intersection of the grid.

If rock is exposed at that particular point, careful note is made of the nature of the rock and a visually representative sample is collected.

If there is no rock exposed at the grid intersection, and none can be found by stripping, the sample is taken from the nearest rock outcrop and the new position is noted.

Samples are individually numbered, packaged, and sent to the laboratory for analysis.

The grid coverage ensures that the field man covers every part of the property. The grid spacing ensures that no part of the property is given spacial attention over any other part of the property. As there is no visible indication of the changes in rock composition which are so diagnostic, it would easily be mislead ing to have the field man concentrate on portions of the property which appeal to him visually.

Because the sample collector is required to break off, name, and retain, samples, at the frequent intervals of the grid, noting the nature of the rock, as it appears visually to him, he carries the geological mapping along as the samples are collected. Thus a geological map is produced, incidently to the mineralogical and petrological evidence, which map is the equivalent of any geological map produced as a separate undertaking. The field man, being a trained geologist, also notes the structural features of the rock.

Thus the survey produces a geological map, which is all that a geological survey produces, but in addition produces all of the mineralogical and petrological information incorporated into the mineral distribution maps, which cannot be obtained by any other means.

Mineral Distribution Maps.

Each sample is quantitatively analysed. The minerals that are present are listed later in the report. The quantity of every mineral in every sample is recorded.

From the record of the mineral composition of all of the samples, mineral distribution maps are made. These maps show the distribution, over the whole property, of one mineral only.

The dots on each map are the sample locations. Plotted beside the dots are the values for the quantity of that one mineral, in recorder units. The same units are used for each mineral The contours, and colors on the maps show the amounts of that one mineral which are present in the various parts of the property.

Where colored, the same color scheme is used throughout, and is as follows;

Dark green	Lowest amount
Light green..........	I n
Yellow...............	c r
Orange...............	e a
Pink.................	s i
Light Blue	n
Dark Blue............	g
Purple...............	Highest amount

For minerals of general distribution, such as quartz, the contour interval and color scheme is arranged so that the color is the same on each map for an equivalent amount of each mineral. Each color change indicates about 10% change in the amount of the mineral with purple indicating all over 70%. Considering the rock type involved, the most extensive color over that particular rock type indicates the average content of that one mineral in that particular rock type.

For those minerals which are absent over large stretches and only developed locally, the color scheme is a direct indication of the amount present. Thus dark green indicates a very small development, or none at all, and purple indicates a very heavy development, (with the other colors being intermediate). A purple color indicates that the rock is practically one mineral only.

To obtain the full value from the maps it is necessary to relate the mineral distributions to the known geology. If a particular concentration of any one mineral can be correlated with a particular geological formation, wherever that formation occurs in the area under investigation, then the mineral concentration is quite probably a primary feature of that formation.

If, on the other hand, the mineral concentration cannot be related to any particular formation, but only to a portion of that formation, or extends into several formations, or has cross-cutting relationships, then we have two possibilities;

a. The elements in the original minerals in the rock have been regrouped, and recrystallized, to form new minerals. This is the process of metamorphism and does not involve the addition, or subtraction, of any material from that already present in the rock. As there is nothing being added there is no agency to transport in the ore.

b. Material from an outside source has reacted with the minerals in the rocks to form new minerals. The reacting material may be anything from molten rock magma to pure water vapour. Hot, aqueous solutions are predominently water in which many elements are dissolved. This differs from a magma in that the dissolved material is incapable, by itself, of forming an igneous rock.

By determining the nature of the unaltered rocks, and also of the altered rocks, we can, by subtraction, determine whether the alteration is due to the addition of magmatic material or of hydrothermally transported material. (Hydro - aqueous, thermal- hot). It is the generally accepted opinion of geologists the world over that metallic orebodies are almost universally transported into place by hydrothermal solutions. We now have ample evidence to substantiate this.

Objective.

Our objective, in surveying a property, is to find concentrations of minerals which cannot be directly related to known geological formations, then to determine whether these concentrations are the work of hydrothermal solutions. We are especially looking for concentrations due to the activity of solutions which have been demonstrated to be the ore-transporting medium for known ore-deposits. We will not overlook evidence of the activity of any hydrothermal solutions.

Minerals present.

The following minerals were determined to be present in the rocks and, together, to form at least 99% of the rock

Quartz .... SiO_2

Orthoclase felspar..... $KAlSi_3O_8$

Albite felspar .... $NaAlSi_3O_8$

Biotite mica .... $H_2K(MgFe)_3AlSiO_4$

Muscovite mica .... $H_2K(AlSiO_4)_3$

Chlorite .... $H_4(MgFe)_3Si_2O_9$

Amphibole .... $Ca_2(FeMg)_5(OH)_2(Si_4O_{11})_2$

Calcite .... $CaCO_3$

Dolomite-Ankerite ..... $Ca(FeMg)CO_3$

Augite .... $CaMg(SiO_3)_2.(FeMg)(AlFe)_2SiO_6$

Olivene .... Fe_2SiO_4

Antigorite .... $H_4Fe_3Si_2O_9$

Ilmenite .... $FeO.TiO_2$

A separate determination of total iron was also made for each sample.

It will be noted, from the list of chemical formuli, that the alkali and alkali-earth minerals potassium (K), sodium (Na), Calcium (Ca) and Magnesium (Mg), are confined to certain specific minerals and are missing from others. For instance, the sodium is confined to the albite felspar. Any increase in the amount of albite would have to be accompanied by a proportional increase of sodium, which could only come from an outside source, as there is no other mineral containing sodium from which the element could be obtained.

Laboratory Procedure.

The samples were ground to -200 mesh and analysed by x-ray diffraction and x-ray fluorescence.

Evidence from the claims.

In addition to ore-deposits which are formed by metallic minerals being transported into a volume of rock there are also mineral deposits which are formed by a portion of the original rock separating out from the molten, or near molten, mass. These are called segregation deposits and are confined to certain minerals and to certain types of rocks.

Thus we have molybdenum characteristically segregating from granitic rocks, nickel segregating from iron-rich basic rocks (norites) and titanium, as ilmenite, separating from anorthosites (as at ALLARD lake).

In investigating your property we are principally concerned with the presence or absence of deposits of Titanium ore similar to that which occurs in Angus township, about a mile east of your property. This deposit is the reason for the interest in the area and it is to try and locate similar deposits within your claim group that we are making the investigation. Naturally we will also be interested in any sign of the presence of any other type of orebody.

General geology.

In Flett and Angus townships there are two bodies of basic rocks which are enclosed in strongly-banded rocks which are granitic and apparently conform to the general rock type which is widely called "Grenville gneiss".

The basic rocks are dark to yellowish green, wite-weathering and frequently green-mottled on the weathered surface.

The two basic bodies form a "V" with a narrow band of gneiss, about one-half mile wide, separating the narrow part of the V. Thus the two bodies may not be of the same age and the spatial relationship may be purely coincidence.

The body in Angus township forms a high hill at the south but the northeastern portion of the body is largely covered by sand plain and extensive swamp. Sticking out of the swamp there is one large outcrop, very low-lying, which is composed almost entirely of a very fine-grained mixture of magnetite and ilmenite. This is the orebody.

To the northeast there are scattered outcrops of Grenville gneiss indicating that the concentration is near the contact. On the west the orebody is surrounded by black gabbroic rock and on the south, southeast and east there is only swamp.

There has been extensive trenching done over the orebody and a large tonnage has been exposed. As much as a thousand feet of continuous ore is exposed in the trenches and the concentration appears to be nearly circular in outline.

Your claim group covers most, but not all, of the second basic body, which is in Flett township. Your property also covers a considerable expanse of the Grenville gneisses especially on the north and east.

Geological map.

A geo logical map of the property has been prepared and is enclosed. Despite many local variations in the appearance of the basic rocks there is no variation which can be recognized as distinctive of any particular part of the body so that the field geologist can only map two rock types, gneiss and gabbro and these two rock types are distributed as shown on the map.

On the western side of the basic body on Flett township the gneisses were noted to be somewhat more basic in composition than the gneisses otherwise encountered on the property, but these rocks were still definitely gneiss and are mapped in conjunction with the rest of the gneiss.

The geological map also shows the traverses which were made to locate and collect the samples and it can be seen that the property was covered in great detail. The field personnel were continuously observing the rocks while proceeding from one sample ~~might~~ site to the next and, if there had been any ore exposed between the sample locations, it would have been observed.

Besides the swamps and sand plains, which cover a considerable portion of the property, the outcrops were often covered by moss and large trees. Extensive logging operations had left great heaps of "slash" which kept the rock from being seen and necessitated stripping for rock exposure at many of the sample locations.

Mineral distributions.

As there was no difference in appearance which could be mapped as a distinct portion of the basic bodies, these have been mapped as uniform masses with nothing to show whether or not there is one portion of them which is more favorable for ore-deposition than an other. Actually there is nothing about the orebody to distinguish it, visibly, from the rest of the basic rock except that it is finer grained. Therefore we must turn to the laboratory evidence to see if there is something which will give us an indication of the reason why the orebody is located where it is and also give us an indication of where there might be other orebodies.

There are some minerals which are confined to the gneisses, some that are confined to the basic rocks and others which are common to both. We will consider them in order.

Quartz.

This plot shows very distinctly the areas of granitic rocks and those which are basic. This plot should be compared with the geological map where it can be seen that the area of rock which contains no quartz is not the same as the exposure of rock that is called gabbro by the field man.

As mentioned earlier, there is a portion of the gneisses on the west of the basic body in Flett township which is more basic appearing than the normal gneiss. It is evident from the quartz distribution that, at least as far as the quartz is concerned, this rock is more closely related to the basic rock than to the rest of the gneiss. This is an indication that the gneissic banding may have been superimposed on the rocks, both granitic and basic, after the basic rocks were in place. Only a small portion of the basic rocks was given the gneissic banding. The banding is considered to be indicative of intense regional stresses.

Within the gneisses the quartz distribution is erratically high but there is apparently more quartz in the gneisses between the two basic bodies. This probably indicates that the introduction of the basic bodies has displaced some silica which has moved out into the adjacent gneisses.

Orthoclase.

This, the potassium felspar, is another mineral whose distribution shows up the basic rocks and the gneisses. There is no Orthoclase in the basic rocks while the gneisses have a great deal. The distinction is not as sharp as in the case of Quartz because there are also considerable portions of the gneisses which do not have any more Orthoclase than is found in the basic rocks. We will see later that these areas of low Orthoclase within the gneisses correspond to areas of high mica.

The amount of Orthoclase in the gneisses is normal and about what would be expected.

These two minerals, Quartz and Orthoclase, are confined exclusively to the gneisses.

Olivene-Antigorite.

This plot shows the distribution of two minerals Olivene, (which was the primary mineral) and Antigorite. The latter mineral is a spontaneous development from the Olivene which develops when Olivene crystals form in a cooling magma where the residual liquid magma contains water. As the cooling progresses the anhydrous Olivene crystals react with the water to form Antigorite. Thus the two minerals are supplementary and show, together, the distribution of Magnesium and Iron Orthosilicate.

While the Olivene is confined to the basic rock it does not compose all of that rock but is confined to a band which curves up through the center of the basic body. There is a much greater development along the depression in which the chain of lakes occurs.

The Olivene is of the variety Fayalite, Fe_2SiO_4, which may contain as much as 30% FeO.

Ilmenite.

The economic value of the ore in Angus township comes from the iron content and from the titanium content. The Titanium is present in the mineral Ilmenite. As a guide to where there is the best possibility of another concentration of Ilmenite, of commercial size, we have plotted the distribution of Ilmenite over the property. The amount of Ilmenite in the ore should be noted. It is several times greater than that found on the property. There is a tendency for Ilmenite to occur all around the contact of the basic rock but there is particularily a band of low concentration which occurs in the west-central part of the basic rock mass.

Comparison with the distribution of Olivene-Antigorite shows that this band occurs along the west boundary of the Olivene-Antigorite band.

Augite.

The distribution of this mineral follows very closely that of the Olivene-Antigorite but it can be seen that they are complimentary as the portion which contains the greatest amount of Olivene contains the least amount of Augite and vice versa. There is no Augite where there is no Olivene however.

The fact that augite develops rather than Olivene-Antigorite indicates that there is more aluminum in the rock. As most Augite also contains some calcium, which is not found in Olivene-Antigorite, this is also an indication that there is more calcium in the rock.

These three minerals, Olivene-Antigorite, Ilmenite and Augite are exclusively confined to the basic rocks. We can now consider those minerals which are found in both basic and gneissic rock types;

Plagioclase.

This mineral, the alkali felspar, is highly developed in both rock types. Actually there are three varieties of plagioclase felspar present. These are, a very calcic variety which is found associated with the Augite and with the extent identical with the Augite distribution, an intermediate variety, (approximately Bytownite or Labradorite), which is associated with those portions of the rock which contain amphibole, and a third variety, highly sodic and close to Albite, which is found in the gneisses. Quantitatively there is little to distinguish the three varieties as the plot of Plagioclase shows.

The only portions of the plagioclase plot which are conspicuously low in alkali felspar are those portions which have a heavy development of Olivene-Antigorite. These areas are colored green.

Mica.

This mineral is indicative of a considerable amount of potassium in the rock. Where there is also iron available the dark Biotite mica forms. Where there is no iron available the whitish Muscovite mica is found. On the plot of Mica the Muscovite occurrences are underlined. It will be noted that these occurrences are distributed widely and at random, bearing no economic significance.

The amount of mica which is present throughout the whole are of investigation is very high. In the gneisses mica is apparently complimentary to the potash felspar. It should be noted that the mica highs correspond to the Orthoclase felspar lows, within the gneisses, and vice versa.

There is one area where the mica is strongly developed within the basic rock and that is along the western side of the basic rock in Flett township. Comparison with the geological map indicates that the field man has placed the contact of the basic rock down the center of this band of mica. This indicates that the material west of the contact is gneissic but does not necessarily indicate that it has any different mineral composition. We have already seen that the area has the low qartz, indicative of the basic rock, on both sides of the visual contact.

Amphibole.

The distribution of this mineral could almost be said to be confined to the basic rock however the development does extend into that area of "basic" gneisses which were noted on the west side of the basic rock mass in Flett township. Thus, once again, we find a mineral assemblage extending on both sides of the visual contact. The best explanation of this is that the contact is determined on the basis of the development of gneissic banding and is not determined by mineral composition. It is indicated that the basic gneiss is actually the normal basic rock which has been given a banded gneissic appearance by regional stresses. These stresses have not changed the mineral composition of the rock but only the appearance.

The area of high mica on the west side of the basic rock mass corresponds very closely to the area of high amphibole and it would appear that the rock in this area is composed of amphibole and mica, with minor amounts of Ilmenite. and an intermediate felspar (plagioclase).

The princopal difference in this mineral assemblage, amphibole,-mica,-intermediate plagioclase,-ilmenite, from the augite,-olivene-antigorite zone to the east, nearer the center of the basic body, is in the amount of potassium which is present in the mica. This potassium could be added to the molten Olivene-bearing rock if the magma was assimilating the potash-bearing gneiss as it was intruded into the gneiss. In this case the potassic (mica) portion og the rock should form a zone all around the contact of the basic body. This is not the case as the amphibole-mica zone is confined to the western part of the basic body, with a smaller portion on the northern boundary.

Iron.

The economic value of the ore deposit in Angus township is derived from the presence of Titanium, as Ilmenite, and of iron, as magnetite. We have plotted the distribution of iron to d etermine what portions of the property were most likely to contain commercial deposits of this element. The plot shows the distribution of total iron in the rock and is <u>not</u> a plot of the distribution of magnetite or any other iron-bearing mineral.

The high iron content in the ore area can be seen and it is also evident that there is an area of about equal iron content along the string of lakes through the center of the property.

Although there is about as much iron in the central lake area of the property as in the ore area this map of iron distribution should be directly compared with the plot of Olivene-Antigorite distribution. It will be seen that the areas of high iron along the string of lakes in Flett township correlates directly with the area of highest development of Olivene while the high iron area at the ore deposit is very low in Olivene. The distinction is that the iron in the ore is in Magnetite, (which is amenable to magnetic concentration), while the iron along the chain of lakes on the property is in the iron orthosilicate Olivene,(which is not amenable to magnetic concentration.

The total amount of iron present in both places is about 20 to 25 units which is indicative of about 32 to 42% FeO. This amount of iron is below the commercial limit unless it is accompanied by some other valuable commodity, such as Ilmenite. In the ore zone in Angus township Ilmenite is present in considerable amount, (as can be seen from the plot of Ilmenite distribution), however the Ilmenite plot shows that, within the property, there is a conspicuous lack of Ilmenite in the portion of the property, along the chain of lakes, which contains the most iron.

Hydrothermal alteration.

Chlorite.

In a mineral assemblage such as is found in the basic rocks on the property, or in the gneisses which surround those basic rocks, the most common mineral produced by hydrothermal atteration is chlorite. Accordingly we have prepared a plot of the distribution of chlorite. It is immediately evident that there is no portion of the property where an appreciable area of rock shows the development of chlorite. The few isolated occurrences are undoubtedly produced by very localized conditions which could have no commercial significance.

We are interested in hydrothermal alteration as the great majority of metallic ore-deposits are transported into place by hydrothermal solutions, hot aquoous gases or vapours, which leave their mark as a wide halo of hydrothermal alteration around the orebody.

In the case of rocks which have a high content of Olivene-Antigorite, as occurs on your property,, hot solution activity is instrumental in changing the Antigorite into asbestos.

There is no evidence of hydrothermal activity which could have introduced a commercial metallic orebody or ~~has~~ have produced a commercial body of asbestos.

Summary of evidence from property.

The foregoing discussion of the distribution of the several minerals found in the rocks on the property shows that there is a basic body enclosed in granitic gneisses.

The gneisses are composed of quarts, orthoclase plagioclase and mica. These minerals show strong variability which is to be expected from the strongly banded gneisses. Any one sample may contain more of the mica band than the quartz band, for instance.

The basic body consists of a central core of nearly pure Olivene surrounded by a rock which id composed of Augite, basic plagioclase, olivene in about equal proportions. On the western side of the basic mass, and in a smaller location on the northern boundary, there is a zone of amphibole, intermediate plagioclase, mica and minor ilmenite.

Structural indications.

One feature of the basic body which is impressiv in the field is the feeling that the changes in\ the appearance of the basic rocks is due to the exposure of different, flat-lying layers.

The only place where the high olivene is exposed is in the center of the basic body where erosion has extended into a topographic depression. Actually this is also a stratigraphic depression.

The sequence of events which has led to the ~~pre~~ present distribution of minerals is as follows;

1. Intrusion of very basic magma, consisting largely of Olivene, (iron silicate), into granitic rocks.

2. Assimilation of granitic material into basic magma forming intermediate iron silicates (augite, amphibole)

3. Separation of mineral and molten rock into layers, (probably under the influence of gravity only). This forms a layer of nearly pure Olivene at the bottom, a layer of mixed augite, olivene and basic plagioclase above that and a top layer of amphibole, intermediate plagioclase and mica.

4. Settling out of Ilmenite from the top layer to form an Ilmenite-rich band at the base of the upper layer.

5. Gentle folding of the assemblage into an anticlinal structure.

6. Tilting of the anticline so that the eastern side is at a higher elevation.

7. Erosion. This has eroded away most of the upper layer, except on the west and north and, in the center of the fold, exposed the bottom layer of olivene.

In obtaining the information about the only known orebody in the area we extended our traverses off of the property to the basic body in Angus township and northeast along that body to the known ore occurrence.

By comparison with the mineral distribution in the basic body on the property it can be seen that, wherever the traverses have encountered the basic body in Angus, the mineral composition corresponds to the upper amphibole-mica-intermediate plagioclase member of the basic body on the propert

The ore occurrence is at the base of this member as in 4 above. Any similar occurrence on the property would be expected to occur at the same level. Most of this favorable horizon has been eroded off of the basic rock in the property. The only place that such a deposit could occur would be where the band of abnormally high Ilmenite occurs, as plotted, and to the west of this under the amphibole-mica layer.

From the distribution of Ilmenite on the property, and from the plot of iron, noting at the same time the thorough coverage which has been made in traversing and sampling the whole property, it is evident that no orebody comparable in size or mineral composition to that in Angus township, occurs at the surface anywhere on your property.

As the layering in the basic rock has apparently been caused by gravitational separation there is a possibility of deposits of heavy minerals, such as magnetite, copper and nickel sulphides, chrome oxides and other heavy minerals, at the base of the assemblage. As only the top of the Olivene layer is exposed there is no way of telling how thick this layer is. The superficial drilling that has been done has certainly not come near the base of the layer.

As the Olivene layer is free of Ilmenite it is probable that any concentration of magnetite at the base of the Olivene layer would be Titanium free.

Recommendations

It is evident that there is no orebody of commercial proportions which outcrops at the present surface.

If it is desired to search farther for Titanium-iron ore deposits then the base of the Amphibole-Mica member on the west of the basic body should be investigated. A magnetometer survey followed by drilling would be the best means of making this investigation.

As there is evidence of gravitational separation within the basic body, there is a possibility of a separation of heavy iron oxides and metallic sulphides at the base of the formation. This base is not exposed and there is no way, except drilling, to determine the depth to the base..

The favorable horizon for Titanium concentration has been eroded off of the eastern and northeastern part of the basic rock on the property.

There is no indication of any hydrothermal activity within the granitic gneisses which could be associated with an hydrothermal ore deposit.

Exploratory drilling to determine the depth to the base of the layered formation wold appear to be the most likely means of eventually leading to a commercial orebody on the property.

Conclusion.

The basic intrusive on the property is separated into layers by gravitational settling. In this respect it resembles the Bushveldt complex of South Africa and several other occurrences in various parts of the world. Many of these occurrences have layers of valuable minerals such as chrome, platinum, copper and nickel. There is practically no indication of the presence of these valuable layers by examining the other layers. The same could be said for the basic intrusive on your property. The layers now exposed show no evidence of any ore concentration at the present surface but the possibilities of the property will not be exhausted until the lower layers, not exposed, are probed.

Yours sincerely,

R. W. Johns

RWJ/me

R. W. Johns P. Eng.

President and
General Manager.

ANGUS TWP
FLETT TWP
FRANKISH LAKE
MACKENZIE LAKE
BREADALBANE LAKE
McDIARMID LAKE
FANNY CREEK
FANNY LAKE
MACKENZIE CREEK
O.N.R.
KENNEY SIDING
BUSH LAKE
MARTEN RIVER
LEGEND
2 GABBRO
1. GNEISSES
SAMPLE LOCATION
TRAVERSES
ROADS
PATHS & TRAILS USED
SWAMP
STRIKE & DIP OF GNEISSOSIT
GEOLOGICAL BOUNDARY
DYKE
HARTLE
FLETT
ANGUS
GOODERHAM

S.P.A.D.E.
DISTRIBUTION OF
IRON
FLETT TOWNSHIP
J.J. GRAY CLAIMS
SERIES T-34540 - T34554, T-34728-T34748, T34786-T34812
T-34834-T34835, T-35589-T-35608
SCALE 1 inch = 400 ft.

31L13SE0004 63.785 FLETT

210

S.P.A.D.E.

DISTRIBUTION OF

ORTHOCLASE

FLETT TOWNSHIP

J. J. GRAY CLAIMS

SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812
T-34834 – T-34835, T-35689 – T-35008

SCALE 1in. = 400ft

31L13SE0004 63.785 FLETT

220

S.P.A.D.E.
DISTRIBUTION OF
AMPHIBOLE
FLETT TOWNSHIP
J. J. GRAY CLAIMS
SERIES T-34540 – T-34554, T-34728 – T-34748, T-3478? – T-34812
T-34834 T-34835, T-35589 – T-35608
SCALE 1 in. = 400 ft

LEGEND.

HIGH
1. Dark green
2. Light green
3. Yellow
4. Orange
5. Red
6. Dark blue
7. Light blue
8. Purple
LOW

31L13SE0004 63.785 FLETT

230

S.P.A.D.E.
DISTRIBUTION OF
PLAGIOCLASE
FLETT TOWNSHIP
J.J.GRAY CLAIMS
SERIES T34540 – T345[illegible], T34728–T[illegible]4748, T34781 – T34812
T34834–T34835, T35589–T356[illegible]

SCALE 1in = 400ft.

31L13SE0004 63.785 FLETT

240

S.P.A.D.E.
DISTRIBUTION OF
QUARTZ
FLETT TOWNSHIP
J.J. GRAY CLAIMS
SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812
T-34834 – T-34835, T-35589 – T-35608

SCALE 1in. = 400 ft


ANGUS TWP
FLETT TWP
MACKENZIE LAKE
FANNY LAKE
T-35606
T-35597
T-35591
T-35596
T-34795
T-34794
T-34790
T-34793
T-34835
T-35603
T-34796
T-34791
T-34553
T-34556
T-34780
T-34729
T-34732
T-34733
T-34734
LEGEND
1. Dark Green
2. Light Green
3 Yellow
4 Orange
5 Red
6 Purple
7 Blue
Low
High
S.P.A.D.E.
DISTRIBUTION OF
OLIVINE-ANTIGORITE
FLETT TOWNSHIP
J. J. GRAY CLAIMS
SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812
T-34834 – T-34835, T-35589 – T-35608
SCALE 1in. = 400 ft
31L13SE0004 63.785 FLETT
260


ANGUS TWP
FLETT TWP
MACKENZIE LAKE
BREADALBANE LAKE
McDIARMID LAKE
FANNY LAKE
S.P.A.D.E.
DISTRIBUTION OF
ILMENITE
FLETT TOWNSHIP
J.J. GRAY CLAIMS
SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812
T-34834 – T-34835, T-35589 – T-35608
SCALE 1 in. = 400 ft
LEGEND
1. Green
2. Light Green
3. Yellow
4 Orange
5 Red
Low
High
31L13SE0004 63.785 FLETT
270

S.P.A.D.E.
DISTRIBUTION OF MICA
FLETT TOWNSHIP
J.J.GRAY CLAIMS

SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812
T-34834 – T-34835, T-35589 – T-35608

SCALE 1in. = 400 ft

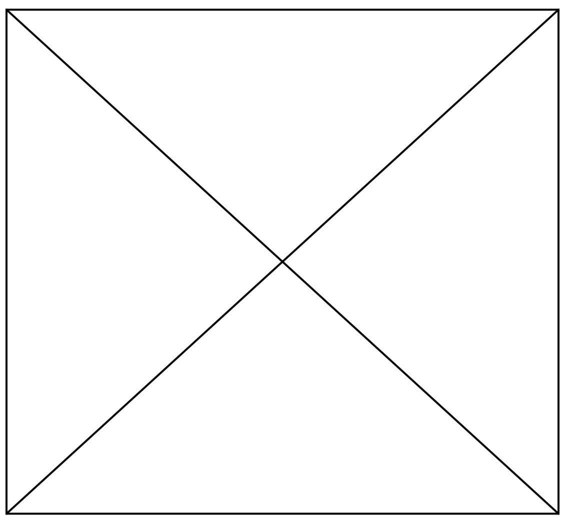
LEGEND

Low

1. Dark Green
2. Light Green
3. Yellow
4. Orange
5. Red
6. Dark Blue
7. Light Blue
8. Purple

High

280



LEGEND

1.	Dark Green	Lowest
2	Light Green	
3	Yellow	
4	Orange	
5	Red	
6	Blue	
7	Light Blue	
8	Dark Purple	Highest

S.P.A.D.E.
DISTRIBUTION OF
AUGITE
FLETT TOWNSHIP
J.J. GRAY CLAIMS
SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812
T-34834 – T-34835, T-35589 – T-36608

SCALE 1in. = 400 ft.

31L13SE0004 63.785 FLETT

300


ANGUS TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
BUSH LAKE
O.N.R.
KENNEY SIDING
MARTEN RIVER
LEGEND
GABBRO
GNEISSES
SAMPLE LOCATION
TRAVERSES
ROADS
PATHS & TRAILS USED
SWAMP
STRIKE & DIP OF GNEISSOSITY
GEOLOGICAL BOUNDARY
DYKE
HARTLE
FLETT
ANGUS
GOODERHAM
S.P.A.D.E.
GEOLOGY
FLETT TOWNSHIP
J.J. GRAY CLAIMS
SERIES T-34540 – T-34554, T-34728 – T-34748, T-34786 – T-34812,
T-34834 – T-34835, T-35589 – T-35608
SCALE 1inch = 400ft.


ANGU TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LA.
McDIARMID LAKE
FALL LAKE
FANNY LAKE


ANGUS TWP
FLETT TWP
FRANKISH LAKE
FALL LAKE
FANNY LAKE

ANGUS TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
LEGEND
HIGH
① Dark green
② Light green
③ Yellow
④ Orange
⑤ Red
⑥ Dark blue
⑦ Light blue
⑧ Purple
LOW


ANGUS TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
LEGEND
1 Dark green
2 Light green
3 Yellow
4 Orange
5 Red
6 Dark blue
7 Light Blue
8 Purple
(Highest)


ANGUS TWP
FLETT TWP
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE


ANGUS TWP
FLETT TWP
FALL LAKE
FANNY LAKE
LEGEND
1. Dark Green
2. Light Green
3 Yellow
4 Orange
5 Red
6 Purple
7 Blue
Low
High


ANGUS TWP
FLETT TWP
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
T-35507
T-35508
T-34748
T-34744
T-34801
T-34806
T-34805
T-34810
T-34809
T-34812
T-34811
LEGEND
1. Green
2. Light Green
3 Yellow
4 Orange
5 Red
Low
High

ANGUS TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
LEGEND
1. Dark Green
2 Light Green
3 Yellow
4 Orange
5 Red
6 Dark Blue
7 Light Blue
8 Purple
Low
High


ANGUS TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
LEGEND
1. Dark Green
2 Light green
3 Yellow
4 Orange
5 Red
6 Blue
7 Light Blue
8 Purple
Lowest
Highest


ANGUS TWP
FLETT TWP
FRANKISH LAKE
BREADALBANE LAKE
McDIARMID LAKE
FALL LAKE
FANNY LAKE
LEGEND
1. Dark Green
2 Light Green
3 Yellow
4 Orange
5 Red
6 Blue
7 Light Blue
8 Dark Purple
Lowest
Highest