

Messrs Gillespie, Moffat & Co.,

Gentlemen,

By your request I have visited the phosphate lands of the Templeton and North Ottawa Mining Company, and have spent several days in examining the springs on these lands; and by now to state for your information the conclusions at which I have arrived.

These will be rendered more intelligible by a few preliminary remarks as to the geological ^{character} and local distribution of the property.

The lands in question are situated on the Laurentian formation ~~on the~~ ~~North~~ side of the Ottawa River, and on the upper part of the Lower Laurentian of Logan, where the gneiss which constitutes the prevailing rock of this district is interstratified with beds of a rock composed principally of the Mineral Pyroxene, and which I

Gray granules
associated with
layers of mica
quartz -

shall following the nomenclature of Dr Hunt
in his reports designate by the term
Pyroxenite. Associated with this
rock are also beds of crystalline
limestone, white in color but often mixed with
green serpentine. In this district the beds of
Pyroxenite and limestone, and especially
the former are known to be
traversed by rich though irregular
veins, beds and bunches of
Apatite or Calcium Phosphate. Hence
the tract of country occupied by these
beds has been known as the "Phosphate-
bearing Belt" where the phosphate has been

then work is
in Pyroxenite
and into the
underneath
and in the
this phosphate
is, large rocks
quartz of phosphate
mica
beds worked
in Pyroxenite
but have
in massive
beds of
quartz

The property held by the Company
above named comprises about 4715 acres
and is situated in the Phosphate-bearing
Belt. In my opinion it has been
very judiciously selected with reference
to probable yield of phosphate and
facility of transport. This applies in
a very special manner to that large
portion of the property situated around
Lake Macgregor, which affords admirable
facilities for water conveyance in summer
and for transport on the ice in winter.

Mr L. G. Miller, the Resident Manager and one of the proprietors, informs me that of the above property 912 acres are held in fee simple, without any royalty, 300 acres are held in fee simple, but subject to a royalty of 50¢ per ton, 649 acres are held on mining rights and 2854 acres on mining rights subject to royalty of 50¢ per ton.

For practical purposes the property may be grouped as follows:—

1. The major part of the property consisting of twenty-two lots or portions of lots in Ranges XI, XII, XIII of Templeton constitutes a block surrounding Lake Macgregor and having means of communication by that Lake.
2. Three detached lots or groups of lots in Range X, two of them being near the outlet of Lake Macgregor but requiring to be reached by roads at present good in winter only.
3. Four detached lots or groups of lots in Range IX, accessible by winter roads.

4. Two detached lots in Range VIII, accessible by roads.

5. One lot in Range II, near the main road and to the railway

These General subdivisions may with advantage be noticed separately.

1. The greatest importance at present attaches to No. 1, as being the ~~larger~~ ^{larger} part of the property, that is most easily accessible and that which has been most extensively worked. On lots 11 and 12 of Range XII the most extensive openings have been made and are known collectively as the "Fidelity" Mine. At this place the beds of Gneiss, Pyroxenite and Serpentine though much contorted have a general strike a little to the east of North and are highly inclined, being apparently bent over a small antinormal fold.

These beds are crossed by two main phosphate veins, running nearly parallel to each other

about East and West. There are also bedded deposits running with the strike of the beds or about N. 20° to 30° E. On the courses of the veins and also of the interstratified beds pits have been sunk and large unrolled masses of phosphate exposed at several points. They are all however mere open cuttings none of them exceeding about 50 feet in depth. From these pits about 800 tons of wet phosphate have in all been extracted, and they serve very well to expose the nature and courses of the deposits.

Following the course of the veins from the shore the ground rises to the height of ninety feet within a few hundred feet, so that there are excellent facilities for drainage. The veins themselves have no well defined walls, and the phosphate occurs in bunches accompanied with Pyrosene, Calcite and crystals of Phosphite or Magnesian Mica. The masses of phosphate in

the veins would seem to be frequent and sometimes attain to a breadth of 10 to 15 feet with a considerably greater length and passing into strings more or less important connecting them with succeeding masses. In the beds or veins conformable to the bedding the mineral seems more regular.

Of these beds a bedded vein one near Mud Bay showed a thickness of 5 to 6 feet of phosphate with a dip to the south west at an angle of 50° . Another at some distance to the northward (the "Doctor" Pit) was seen to be from 3 to 4 feet thick with a dip to $S 70^\circ E$ at a high angle. The first mentioned bed has been traced for about 250 yards.

The mineral in all the deposits is a crystalline Fluorapatite, either hard and cleavable or purely granular. It can be crushed ^{by hand} to a state of almost perfect purity. The colour is usually green but occasionally reddish. The openings made at this place can scarcely be regarded as other than mere trial pits; but they have so far paid well

and afford good indications of a large yield of Phosphate when the deposits shall be more fully opened up.

At Clear Lake on Lot 11 Range X117 a vein has been opened on a narrow ledge about 60 feet in height and shows a thickness of from 4 to 12 feet of Phosphate. It has yielded 60 tons, and the indications are that while cut off ~~to~~ on the line of strike to the eastward of a ridge of granitic gneiss it will be productive in descending and to the westward. This vein has been exposed for a length of about 50 feet with a course of S. 80° E, its attitude being nearly vertical.

On Lot 21, Range X11, a jet recently opened (the Bishop's Pit) shows a vein of Phosphate and Pyroxenite about 20 feet in width and holding a large proportion of Phosphate which also extends laterally from it ~~into~~ in thin bands in the strike of the containing rock. This place is on the side of a ^{steep} hill and at an elevation of 180 feet above the lake.

On the other lots in this
division small openings have
been made; but there were
sufficient to show the existence
of the phosphate bearing Pyroclastic
beds and the existence of
deposits similar to those on
the lots which have been
more fully opened.

2. Of the second division of
lots in Range X, I visited nos 8, 15 &
16. On lot 16 on a hill
250 feet above the Maunabo River,
the outlet of Lake Maunapu I saw
a very promising phosphate vein
which has up recently been uncovered.
It seems capable of yielding an
average of about 4 feet of phosphate
enclosed in a matrix of red
caliche. Only a short length of the
vein was exposed. On lot 15,
other veins are exposed also with
a matrix of caliche beneath layers
of a hard dense phosphate parallel
to the bedding. On lot 8 an opening

had been made in a ^{of pure phosphate} vein, about
a foot in width, and a number of other
Copies occur on the same lot.

The company has as yet done little on
these lots owing to the cheaper transport

of phosphate
the disadvantage
of mining

from those of the Fort Sumner. [†] Other
parties have ~~been~~ opened private
drift mines on neighboring
lots where they have no cheap means

equally remote from [†] of water carriage

3. The lots on Range IX have been
largely explored and are yet
covered with forest. They include the ^{usual}
phosphate-bearing ~~lands~~ ^{spots}, and are
said to have afforded fair phosphate
exposures.

4. On Range ~~the~~ VIII the principal
opening is that named the "Pioneer"
not now worked but which has yielded
10. ~~to~~ ²⁰ tons of phosphate. At one point
this vein attained a thickness of

† and a mile shows
local phosphate
in the bottom
of the excavations

12 feet. [†] It comes in at 700 W and
at the west end ^{of an open 20 feet long} it is cut off by a
fault which seems to have thrown

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A considerable distance to the
North where it has been recovered
and traced to where it seems
to run out in apparently purple
rock. In the opposite direction the
vein runs into a valley occupied
by a bed of Suenstone into which the
vein has not been followed.

The other lots on range VIII were
not visited. They are stated to
occur in the phosphate-bearing rock
and to have afforded exposures
of the mineral but have not
been worked.

5. On Range II the company
holds a lot of 100 acres ^{of a great distance from the others,} which is
on a different belt of country
from the others and presents
very different conditions. At this
place ~~the~~ the phosphate occurs in
disseminated crystals in a dull
reddish Suenstone which is fine
with purple. The deposit is evidently
a bed and certain layers become
rich in crystals of phosphate as
determined about 80 percent of the

Mineral while others contain only
trace. Deposits of this
kind are not now worked owing
to the difficulty of separating
the phosphate from the carbonates
such. Methods for doing this might
however be devised provided
that an increasing thickness had
any that layer of a several
feet thickness rich in
phosphate. In the mean time
this part of the paper is of
no practical importance.

From a consideration of the
facts above referred to I have
no hesitation in concluding that
the property contains a vast
quantity of apatite, the total amount
of which it would at present be
impossible to estimate, and
that its value in this respect
would be great to be developed.

The deposits are not superficial
they will no doubt extend in depth

through the Greene and Colwell bands
and as these are of great breadth
and highly inclined they are not
likely to be exhausted in depth. The
explorations hitherto made would
indeed seem to indicate that the deposits
are in general as expected ^{to}

improve in descending ^{from the upper levels}
large demands for the shell of the ^{of the levels they may have}
the elevated and when character

of the ground and natural drainage
to a considerable depth, so that there
is no difficulty ^{was been} in occurrence of water in
the crevices in the cup of the deposits
and in most of the lots extensive mining
operations could be carried on with
drainage of levels.

The openings hitherto made are
all mostly on rocky ridges and
sides of cliffs where "shells" have
appeared, but I anticipate that
when more extended mining operations
are undertaken and pursued into
the lower levels ~~there~~ the deposits
will be found to increase.

There is no reason to believe
that the explorations hitherto made

have exhausted the unknoll
deposits. On the contrary in the
present year Mr Miller informs
me that 117 additional "shows"
have been found by explorers, and
it is probable that some of these
may prove as valuable ~~as~~ ^{as} any
of their predecessors. As to the
cuts already ~~opened~~ ^{worked} present signs of
exhaustion. On the contrary most
of them ^{ships} ~~have~~ ^{unhappily} ~~been~~ ^{consumed} ~~by~~ ^{of} ~~the~~ ^{the}
~~years~~ ^{years} in which they have been opened
~~for the extraction of the mineral.~~

^{in 1877} The total yield of the present
cuts is stated to have been 600 tons
of No 1 or 80 percent Phosphate and
this has been almost entirely taken
from lots 12 & 11 Range XII and from lot
15 Range VIII. The cost of extraction
and delivery at the Ottawa R
was \$10 to 11 per ton.

In the present year Mr
Miller estimates that 1000 tons
may be extracted with his present
means, and as much of the
labor hitherto expended has
been for exploration rather than for

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1881

extraction it is possible that the
cut might be reduced to \$8 per
ton. Ground evidence follows
of the road leading from the
Wangahaiti coast of Te Anau
& the shore of the Ottaua about
10 miles were improved.

The amount of Phosphate
to be extracted in the future
could seem to be limited only
of the number of men em-
ployed and the productive
application of their labour.

With reference to the latter
I am of opinion that more regular
mining operations might be resorted
to with advantage, on the lots
already opened up. In carrying on
these however it will have
to be kept in view that the removal
is confined a way to the fragments
of calcite bands, that these are
affected by the carbonates & which the
calcification beds have been subjected
and that they are cut by faults

Faults and granite dykes which in
some places will render ^{working} the veins
~~difficult~~ ^{impracticable} difficult to work. Much
judgment will therefore have to
be exercised in the location of
adits or shafts. Being with the
Mammoth drill upon I think to
be ~~usual~~ employed with advantage
in locating the deposits before making
regular mines open them.

Should such regular mining
be undertaken it will be desirable
first to examine the surface exposures
and exhaust in the different out-
crops etc. This has heretofore been
conducted by Mr. Velle in ~~the~~ a
most economical and ^{judicious} ~~successful~~
manner. Mr. Velle also has conducted
~~these operations~~ The people of the
County can readily be ^{induced} ~~persuaded~~ to
work these mines - Mr. Velle informs
me that there has been employed here
^{recently} all been obtained by himself within
the past two years. It will therefore
be unnecessary to introduce miners from
abroad, ~~except~~ unless it should be

deemed desirable to secure a few men accustomed to the methods employed in working on Mineral veins

It is to be observed that up to this time attention has been given only to what is called No 1 Phosphate which is a percentage of about 80. All that falls below this standard, when subjected merely to a rough hand picking, ~~all that falls below this percentage is thrown aside as No 2 which amounts in bulk to nearly half the yield of the Mines. It is mixed with lumps of mica, Pyroxene and Calcite. It is estimated that at an expense of about \$2 per ton this No 2 Mineral might be re-dressed and would afford a certain ^{amount} percentage of No 1 Phosphate and a large ~~percentage~~ ^{quantity} of a second quality of ^{a standard of} about 60 percent, and if this could be disposed of the yield of the Mines might be proportionally increased.~~

I had not opportunity to visit
5 lots the property of the Company
in the town of Portland. There
are no doubt valuable but from
the greater distance of transport
of no great importance.

In ~~visit~~ ^{visit} to the ~~lots~~ ^{property} I had the
advantage of the company of Mr
Munn of the Queen College of Rhode
and of Mr Ashburn of Montreal.
Mr Muller the manager of the
mine and one of the proprietors
accompanied us and gave us
the benefit of his extensive local
knowledge and experience
in the exploration and opening
of these deposits.

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DePaul in
St. Louis
1871