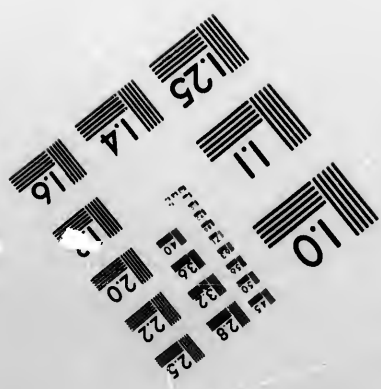
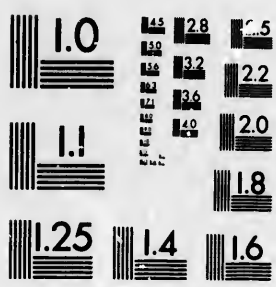


**IMAGE EVALUATION  
TEST TARGET (MT-3)**



**CIHM/ICMH  
Microfiche  
Series.**

**CIHM/ICMH  
Collection de  
microfiches.**



Canadian Institute for Historical Microreproductions

Institut canadien de microreproductions historiques

**1980**

Technical Notes / Notes techniques

The Institute has attempted to obtain the best original copy available for filming. Physical features of this copy which may alter any of the images in the reproduction are checked below.

L'institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Certains défauts susceptibles de nuire à la qualité de la reproduction sont notés ci-dessous.

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Coloured covers/<br>Couvertures de couleur  | <input type="checkbox"/> Coloured pages/<br>Pages de couleur      |
| <input type="checkbox"/> Coloured maps/<br>Cartes géographiques en couleur  | <input type="checkbox"/> Coloured plates/<br>Planches en couleur  |
| <input type="checkbox"/> Pages discoloured, stained or foxed/<br>Pages décolorées, tachetées ou piquées   | <input checked="" type="checkbox"/> Show through/<br>Transparence |
| <input type="checkbox"/> Tight binding (may cause shadows or<br>distortion along interior margin)/<br>Reliure serré (peut causer de l'ombre ou<br>de la distorsion le long de la marge<br>intérieure) | <input type="checkbox"/> Pages damaged/<br>Pages endommagées      |
| <input type="checkbox"/> Additional comments/<br>Commentaires supplémentaires   |   |
- 

Bibliographic Notes / Notes bibliographiques

- |  |   |
|--|---|
| <input type="checkbox"/> Only edition available/<br>Seule édition disponible         | <input type="checkbox"/> Pagination incorrect/<br>Erreurs de pagination     |
| <input type="checkbox"/> Bound with other material/<br>Relié avec d'autres documents | <input type="checkbox"/> Pages missing/<br>Des pages manquent               |
| <input type="checkbox"/> Cover title missing/<br>Le titre de couverture manque       | <input type="checkbox"/> Maps missing/<br>Des cartes géographiques manquent |
| <input type="checkbox"/> Plates missing/<br>Des planches manquent                    |   |
| <input type="checkbox"/> Additional comments/<br>Commentaires supplémentaires        |   |

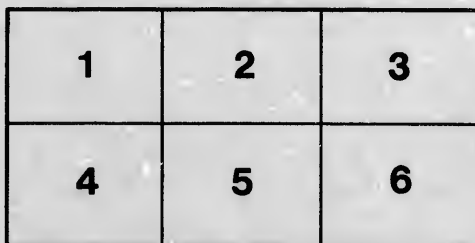
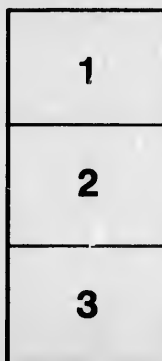
The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

The last recorded frame on each microfiche shall contain the symbol  $\rightarrow$  (meaning "CONTINUED"), or the symbol  $\nabla$  (meaning "END"), whichever applies.

The original copy was borrowed from, and filmed with, the kind consent of the following institution:

Library,  
Geological Survey of Canada

Maps or plates too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition de la copie originale et de la netteté de l'exemplaire filmé conformément avec les conditions du contrat de filmage.

Un des symboles suivants apparaît sur la dernière image de chaque microfiche, à savoir le symbole  $\rightarrow$  signifie "A SUIVRE" ou le symbole  $\nabla$  signifie "FIN".

L'exemplaire filmé fut reproduit avec la gracieuse et généreuse collaboration de l'établissement prêteur suivant :

Bibliothèque,  
Commission Géologique du Canada

Les cartes ou les planches trop grandes pour être reproduites dans une seule image sont filmées à partir de l'angle supérieur gauche, de gauche à droite et de haut en bas, en prenant autant d'images que nécessaire. Le diagramme ci-dessous illustre la méthode :

11CNP  
, C46

REPORT  
ON THE  
PHOSPHATE LANDS  
OF THE  
TEMPLETON & NORTH OTTAWA  
MINING COMPANY.

---

BY  
E. J. CHAPMAN, PH. D., &c.,  
*Professor of Mineralogy and Geology in University College, Toronto,  
and Consulting Mining Engineer.*

---

TORONTO:  
LOVELL BROTHERS, PRINTERS, 39 & 41 MELINDA STREET.  
JUNE: 1878.



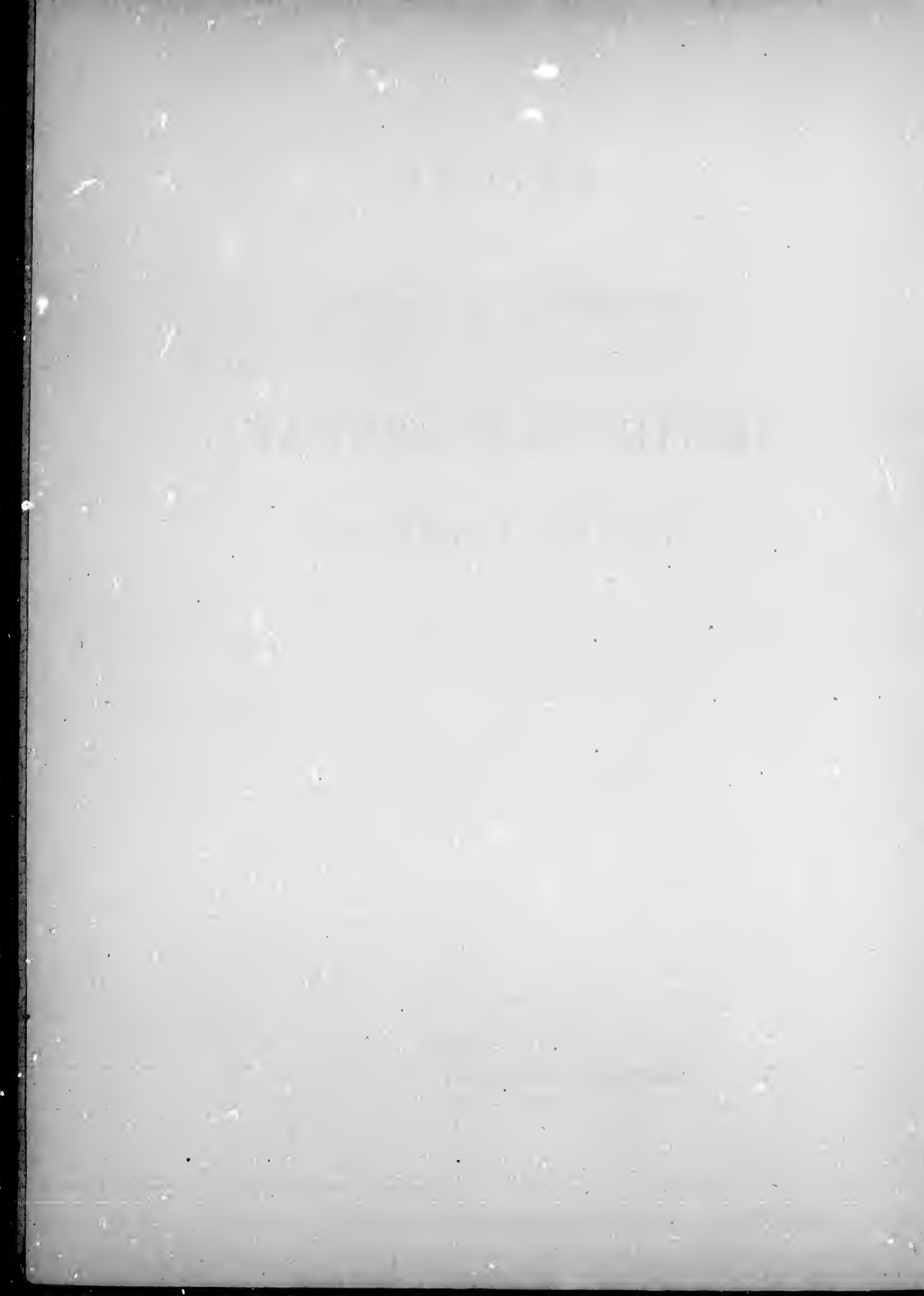
REPORT  
ON THE  
PHOSPHATE LANDS  
OF THE  
TEMPLETON & NORTH OTTAWA  
MINING COMPANY.

---

BY  
E. J. CHAPMAN, PH. D., &c.,  
*Professor of Mineralogy and Geology in University College, Toronto,  
and Consulting Mining Engineer.*

---

TORONTO:  
LOVELL BROTHERS, PRINTERS, 39 & 41 MELINDA STREET.  
JUNE: 1878.





REPORT  
ON THE  
PHOSPHATE LANDS  
OF THE  
TEMPLETON & NORTH OTTAWA MINING COMPANY.

—O—

To F. W. HENSHAW, Esq., &c., &c.

MONTREAL.

SIR,—Having received your instructions to examine the PHOSPHATE LANDS of the TEMPLETON AND NORTH OTTAWA MINING COMPANY, and to furnish you with an impartial Report upon the property, I visited the ground, and remained there during an entire week, at the commencement of the present month (June, 1878). In my examination of the ground, I had the valuable guidance of Mr. J. G. MILLER, whose intimate knowledge of the district, and of phosphate deposits generally, rendered his co-operation of the greatest service, and enabled me to save much time in my investigation of the numerous lots belonging to the Company.

On the assumption that my Report is mainly intended for public information, I have confined myself as much as possible, in drawing it up, to the discussion of practical details as distinguished from points of purely scientific or theoretical interest. The Report, thus limited, embodies the following subdivisions:—(1) Site and general description of the Property; (2) Mineral Features; (3) Composition and average quality of the Phosphate; (4) Statistics and general conclusions.

(1) *Site and General Description of the Property*:—The phosphate lands of the Templeton and North Ottawa Mining





The following is a complete enumeration of the Company's lots.\*

#### A. TOWNSHIP OF TEMPLETON.

Range 2, South part of east half of lot 15, (100 acres). Lies a mile and a half from the river front. Contains at least two phosphate-bearing bands of considerable width, but at present altogether undeveloped. The phosphate is distributed in numerous crystals through bands of limestone. It would be advisable to test these limestone bands by boring, as the phosphate may very probably run into workable bunches at a moderate depth from the surface. The lot, however, lies completely apart from the main mining ground of the Company: It is known as the "Bertrand" lot.

Range 3, East half of lot 15 (100 acres). Two pits, known as the Pioneer Pits, have been opened on this lot, and 162 tons of phosphate have been shipped from their yield. In one, a long lead of phosphate occurs on the pit-floor, and evidently indicates a further extension of the workable mass.

Range 3, continued: East half of lot 19, and west half of lot 20 abutting on Latourneau's Lake, (200 acres). Good indications of phosphate, but the lots, at present, are practically unexplored. The surface-rock for the greater part is entirely concealed by soil, fallen timber, &c. This applies also to many other portions of the Company's property.

Range 9, North half of lot 4 (100 acres), south half of lot 5 (100 acres), east half of lot 8 (100 acres), south part of lot 11 (90 acres). Fair shews on all, but none yet opened out. East half of lot 19 (100 acres). Several promising shews from which a few tons of phosphate have been taken, occur on this lot, but the ground practically is still unopened. Mr. McLaurin's deep pit, from which upwards of 600 tons have been already obtained, lies on the adjacent lot 18; and some fair shews occur also on lot 17.

Range 10, lot 8 (200 acres). Contains fourteen or fifteen good shews, not yet opened. West half of lot 11 (100 acres): shews several exposures, two partially stripped but not yet worked. North half of lot 12 (100 acres): perhaps less promising than some of the other lots in this Range, but containing several shews from the surface of which a ton or two of good phosphate has been extracted. South half of lot 16 (100 acres), the "Brown" lot: very promising shews but at present unworked.

Range 11, lot 12 "Birch Point" (160 acres), lot 13 (130 acres), lot 14 (80 acres). These lots lie on Courville's Bay, a southern extension of MacGregor's Lake. They shew several very promising leads, from trial-pits on which about 24 tons of phosphate have already been taken; but

\* The small map, which accompanies this Report, exhibits the position of the more central and important lots of the Company in the north part of Templeton. Other phosphate lands belonging to the Company, in Templeton and Portland, lie beyond the limits of the map, but are referred to in the Report.

the deposits are at present merely opened. Lot 16 (200 acres); slight shews, unworked. Lot 19, north half (100 acres): four good shews; but if worked in summer, a road to this lot is required.

Range 12, lot 11 (200 acres): several fine shews, one opened in the "Carey" Pit, but scarcely worked as yet, although about six tons have been taken from its surface. Lot 12 (200 acres). This lot has yielded the principal portion of the phosphate hitherto taken from the Company's property, and it is still being largely worked. Its southern border abuts on Mud Bay and MacGregor's lake, on which a good wharf has been erected. Twelve or thirteen pits, known collectively as the "Fidelity Mine", have been opened on the lot. These are referred to, more fully, in § 2, below. One pit, the "Trusty", 52 ft. deep, has yielded 320 tons of first-class phosphate; and another, the "Emerald", has yielded 150 tons. Lot 13 (130 acres): contains a number of good shews, on one of which a little sinking has been done (the "Baron" Pit), and about seven tons have been taken out. Over fifty exposures of phosphate in small strings and leads occur on a steep hill-side on another part of this lot. These shews, although small in themselves, are quite as promising as many surface shews, on other lots, which have opened out into good workable bunches at comparatively slight depths. Lots 15 and 16 (100 acres, each): practically unexplored, but shew indications of phosphate in several places. Lot 19 (180 acres): four slight shews, altogether unworked as yet. Lot 21, north half (100 acres): several shews, one exceedingly promising (Bishop Pit) on which work is just being commenced. It extends over a considerable space. A deposit, a short distance to the north-west of this lot (just beyond the Company's limit) known as "Breckon's Mine," has yielded over 400 tons, and is constantly improving. Its surface shew does not appear to have been as promising as that at the Bishop Pit on the Company's ground.

Range 13, lot 11 (200 acres). About the centre of this lot, near the south-west extremity of Clear Lake, a deep pit has been carried down on a large deposit of very pure green phosphate. The pit has already yielded over 60 tons, and is still improving. Another shew, unworked as yet, occurs a short distance west of this opening. Lot 12 (170 acres): contains a very promising surface shew, as yet only picked over. Other smaller shews also occur on the lot. Lot 14 (190 acres): altogether unexplored, but evidently a promising country. Lot 17 (57 acres): consists of two portions separated by the southern extremity of Grand Lake. Good shews occur on both, but have not at present been opened.

#### B. TOWNSHIP OF PORTLAND.

Range 2, lot 17 (120 acres), lot 18 (130 acres), lot 31 (120 acres), lot 32 (130 acres). Good shews, mostly of red phosphate, but altogether unworked.

Range 3, lot 19 (120 acres). Fair shews, but lot practically unexplored. Ground, heavily timbered.

(2). *Mineral Features* :—The country-rock of the district in which the phosphate property of the Company is situated, consists of Laurentian gneiss, in thick and thin beds, composed essentially of quartz and orthoclase feldspar, with a little mica in some places, and much hornblende in others. The mica, as a rule, is sparingly present—and in this respect the gneissoid rock presents a marked contrast to the phosphate-bearing veins, in most of which a magnesian mica (phlogopite) occurs largely, or forms, even, the predominating portion of the veinstone. Coarse brown garnets, and here and there crystals of black tourmaline are also occasionally present in the gneiss. Over the greater part of the Company's property, the strike of these gneissoid rocks is in a general north and south direction, although subject to local exceptions. Numerous veins, some of great width, traverse the country-rock almost at right-angles, or in a general east and west direction. These veins carry the phosphate deposits. They consist, mostly, of a mixture of coarse crystals of brown magnesian mica (phlogopite), light or dark green pyroxene, and white or pale-reddish calcite; and a banded structure is sometimes observable in them. In some cases—as on the Bertrand Lot: 15 in Range 2 of Templeton—the veinstone consists essentially of crystalline calcite; but in most of the veins within the limits of the property, the chief portion of the gangue consists of either phlogopite or pyroxene, or of an intermixture of these magnesian silicates. In some veins, finely-crystallized scapolites, and quartz and zircon crystals, are also present. The phosphate—fluor-apatite—lies in more or less lenticular masses within the gangue, and throws out small strings or “leads” in various directions. In practically all the veins, the phosphate at the outcrop of the vein shews merely thin strings and patches, with perhaps a few scattered crystals in the surrounding veinstone; but in descending, the strings run more or less together, and at the depth of a few feet a solid bunch or mass of apatite is frequently struck. This, as a rule, expands rapidly; but after widening to from two or three, to over ten or fifteen feet—or in special cases to a

still greater breadth—it gradually contracts again, and finally thins out. The annexed sketches present generalized sections of phosphate masses of this kind: fig. 1 being a section along the run or course of the vein; and fig. 2, a section across the vein. In some cases, a mass of phosphate, after contracting to a very narrow width—or being partially cut off by large fragments or horses of gneissoid rock lying within the vein—has again opened out into workable dimensions.



Fig. 1.

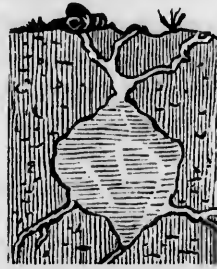


Fig. 2.

The actual width of these phosphate-bearing veins exceeds in some instances twenty or thirty feet, but in most cases it remains still to be ascertained, as the excavations have necessarily been confined to the phosphate masses, the other portions of the vein being left unstripped. At present, also, no definite attempt has been made to continue the workings below the first phosphate masses, the primary object being to get out as much phosphate as possible without incurring the expense of deep sinkings. But it may be legitimately inferred that other masses will be found at greater depths,—not necessarily directly under the others, but in the vicinity of these. It would seem advisable, therefore, to test the veins more thoroughly by a few deep borings carried down upon the vein at different spots. I am convinced that this would lead to the discovery of other workable deposits.

The course of the veins, it has been stated on a preceding page, is mostly in a general east and west direction. In

one or two cases, this cannot, at present, be actually proved, but in the greater number of examples it is sufficiently manifest. Thus, at the "Fidelity Mines," on the more southern portion of lot 12 in the 12th Range of Templeton, three veins, at least, may be clearly traced by the pits already opened upon them. Near the lake margin, in passing from east to west, these pits comprise: the "Surprise," the "Tricky," the "Emerald," (from which 150 tons of phosphate have been taken), the "Feeder" (which has yielded 25 tons), the "Boulder," and the "Tidy." A second vein, running in the same general east and west direction, a chain or two north of the above, outcrops on the shore of Mud Bay, where it shews a long and very promising lead, and is opened farther west at the "Trusty," the "Colossal," and the "Purity" pits. From the Trusty pit, 320 tons of phosphate—representing a profit of nearly \$2000—have already been obtained. A third vein, still farther north, has been opened at the "Red," the "Hermit" and the "Carey" pits, which also lie east or west of one another.

Two facts here come prominently to the surface. First, the very important fact that the phosphate lies in irregularly-lenticular masses imbedded in true fissure-veins, the essential or characteristic veinstone being brown magnesian mica in large crystals, pyroxene, or calcite, or a mixture of these minerals,—from which it may be concluded that workable deposits of phosphate will be found at greater depths than those hitherto reached. And secondly, the fact of the veins running (at least, in most instances) in a general easterly and westerly direction, a knowledge of which may facilitate the discovery of workable masses at present concealed.

(3). *Composition and average quality of the Phosphate* :— The mineral substance technically termed "phosphate" in Canada, is known mineralogically as Apatite. Of this mineral, two leading varieties are recognized. In one, the substance may be regarded as essentially a compound of phosphate of lime and fluoride of calcium; and in the

other, of phosphate of lime and chloride of calcium. In the first variety, however, a small amount of chloride of calcium, and in the second a small amount of fluoride, is also invariably present. All the Apatite hitherto found in Canada consists of Fluo-phosphate. If quite pure—that is, if absolutely free from the slightest trace of intermixed foreign matters, a condition in which, of course, it can only occur exceptionally—it contains a little over 92% of phosphate of lime. This percentage, however, is manifestly unattainable in samples of even a few pounds' weight; and in ordinary shipping samples of first-class quality, 80 or 81 per cent. may be considered a high average. As regards colour, our Canadian apatites vary from pale greenish white to apple-green and deep sea-green, on the one hand; and through light tints of pink, to clear-red and deep chocolate or brownish-red, on the other. As regards quality, the colour is altogether immaterial. In texture, our apatites vary from a highly crystalline, cleavable condition, to a coarse or fine granular state. In the latter condition, the substance is apparently more readily acted upon by sulphuric acid, in its conversion into marketable surper-phosphate, but in other respects the difference is immaterial.

The masses of phosphate when broken up at the Company's pits, are cobbled or hand-dressed, and carefully looked over, and in this manner a good deal of the phosphate is rendered almost pure; but, of course, in large heaps a few pieces of inferior quality will often escape detection. In most of the dressed heaps that came under my notice on the ground, the percentage of tribasic phosphate would certainly average 79 or 80, and in many of the piles it would go considerably higher—probably as high as 82 or 83. On my return to Ottawa, I stopped at Dunning's wharf—the shipping place on the Ottawa River—and selected from a heap of many tons' weight two or three pieces in which visible grains of calcite and mica were present, and which, therefore, were certainly rather under than over the average quality of the sample. A complete analysis of



these specimens, just completed in my laboratory, has yielded the following results:

Tribasic Phosphate of Lime, . . . . .	80.88 %
Fluoride of Calcium, . . . . .	6.22 "
Chloride of Calcium, . . . . .	0.38 "
Intermixed Carbonate of Lime, . . . . .	4.76 "
Intermixed Mica and Pyroxene, . . . . .	5.63 "
Dissolved Iron-oxide, . . . . .	0.44 "
Hygroscopic-moisture and loss, . . . . .	1.69 "

(4). *General Conclusions*.:—Notwithstanding the still undeveloped condition of the greater portion of the lots belonging to the Company, my examination of the ground has convinced me that a very large amount of workable phosphate must be contained within the limits of the property. It is not indeed possible to arrive at any other conclusion, although no definite statement of the actual amount of phosphate can be given, in consequence of the irregular mode of occurrence of the phosphate masses, and the slight depth to which the excavations have at present been carried. The exposures, however, are exceedingly numerous; and in addition to those already discovered, others are constantly coming under notice in the remoter portions of the property. If only one in every three or four of the exposures which I examined were to open out favorably, a very large output would necessarily be obtained. In all the veins hitherto opened, moreover, only the mere surface portions have as yet been worked, whilst everything points to the conclusion that at lower depths the veins would at least prove equally productive.

The cost of winning and dressing the phosphate, and teaming it to the wharf on the Ottawa River, appears to average at present about \$10 per ton, or, at least, not to exceed that sum. From the wharf to Montreal, the freight may be put at \$1 or \$1.25 per ton, the latter being probably in excess of the actual average. Allowing therefore for handling, loss, &c., the maximum cost of laying down the phosphate in Montreal would be about \$11.25 per ton; whilst the present price of 80 % phosphate in that market

is from \$18 to \$19, with a marked tendency to rise. At the lower quotation, consequently, it is evident that a good profit should be realized alone from the lots now under *exploration*.

In concluding this Report, I may again express my thorough conviction that the Company possesses in these lands a most valuable phosphate property. Under judicious management, the property, I feel assured, will yield good returns for the outlay expended upon it.

I have the honor to be, Sir,

Your obedient servant,

E. J. CHAPMAN, PH. D., &c.,

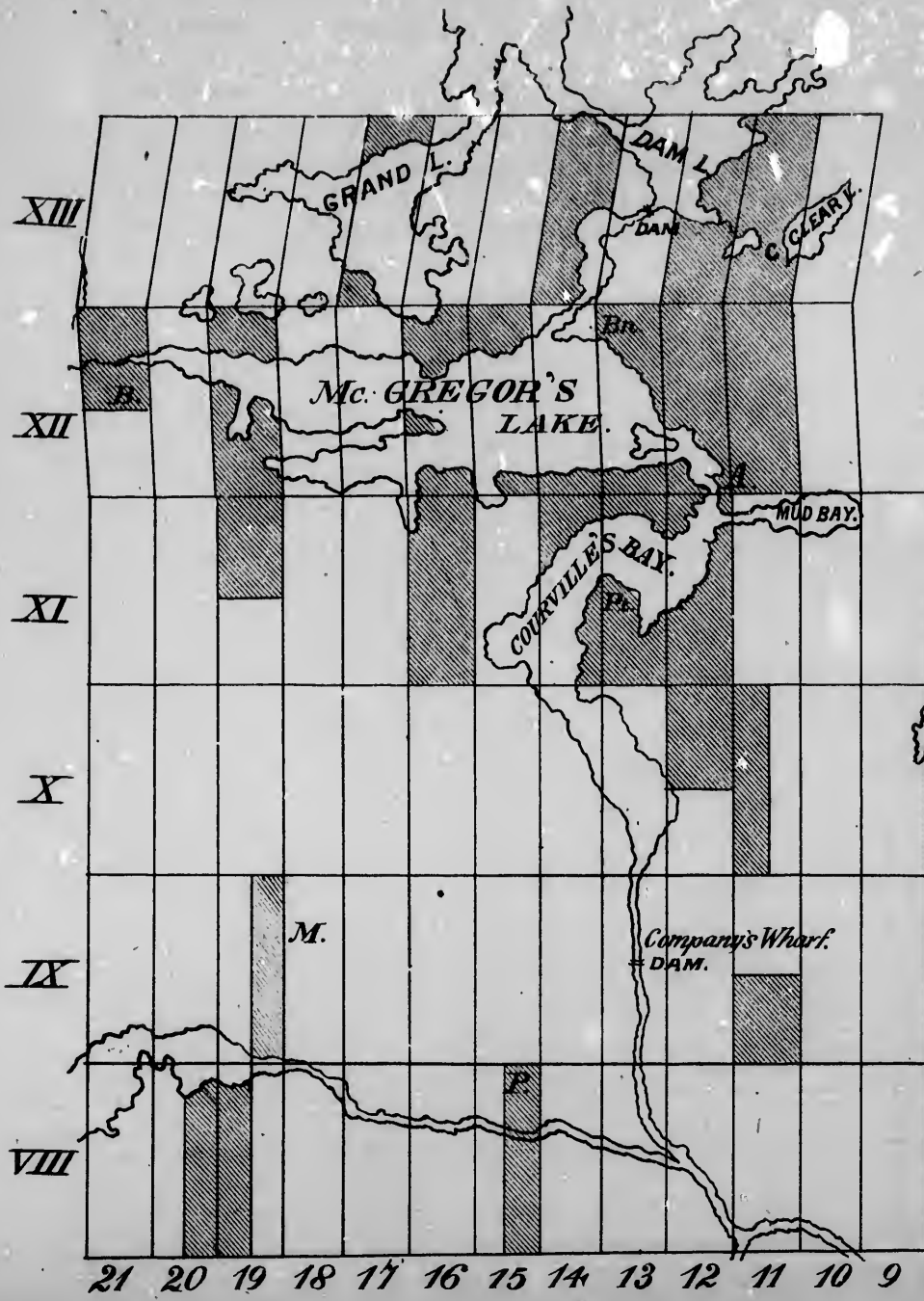
*Professor of Mineralogy and Geology in University College, Toronto,  
and Consulting Mining Engineer.*

TORONTO, June 15th, 1878:



# PHOSPHATE LANDS

Of the Templeton and North Ottawa Mining Company,  
In the Township of Templeton, Quebec:  
Concessions viii to xiii inclusive.



### REFERENCES:

The Company's Lots are denoted by oblique shading.

A. Fidelity Group of Mines, with wharf, &c., Lots 11, 12; R. xii (see Report).

B. Bishop Pit; Bu. Baron Pit.

C. Clear Lake Mine (see Report).

Pt. Birch Point.

M. Position of the McLaurin Mine.

P. Pioneer Pits.

For other localities, see the Report.

Scale (approximative) 1 inch to the mile.

E. J. C.

June, 1878.

