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# MINING REVIEW

VOL. 3.—No. 2.

1885—OTTAWA, MARCH—1885

VOL. 3.—No. 2

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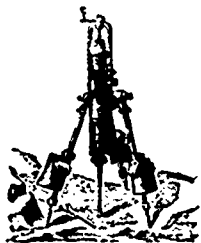
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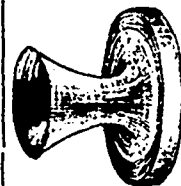
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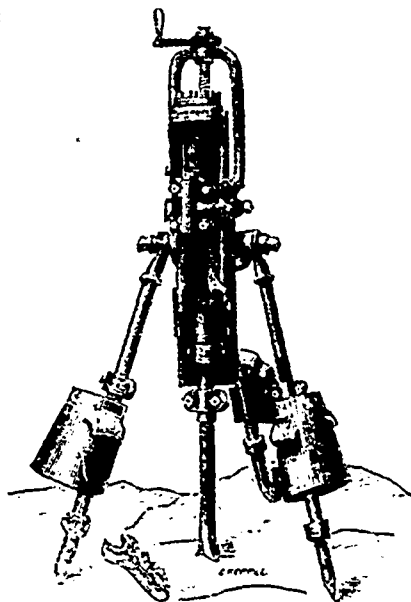
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Copies of the plan and specification can be seen at the Clerk of Works' Office, New Dominion Building, Berlin, Ont., and at this Department, on and after Monday, 23rd inst.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,  
**A. GOBELL,**  
Secretary.

Department of Public Works,  
Ottawa, 23rd March, 1885. } (16 2)



**NOTICE TO CONTRACTORS.**

SEALED Separate Tenders addressed to the undersigned and endorsed "Tenders for Hot Water Heating Apparatus, Saint Thomas, Ont.," will be received at this Department until MONDAY, 6th proximo.

Copies of the plans and specifications can be seen at the office of Edwin Ware, Architect, St. Thomas, Ont., and at this Department, on and after Monday, 23rd inst.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

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**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Firewood," will be received at this office until Wednesday, the 5th day of April next, at noon, for the supply of Firewood for the use of the Public Buildings, Ottawa, according to the specification to be seen at this office, where forms of tender can also be obtained.

No tender will be considered unless made strictly in accordance with the printed forms, and, in the case of firms, except there are attached the actual signature, occupation and place of residence of each member of the same.

The tender to have the actual signatures of two solvent persons, residents of the Dominion, and willing to become sureties for the due performance of the contract, and to be accompanied by an accepted bank cheque for the sum of five hundred dollars, payable to the order of the Minister of Public Works, Ottawa.

The Department will not be bound to accept the lowest or any tender.

By order,  
**A. GOBELL,**  
Secretary.

Department of Public Works,  
Ottawa, 11th March, 1885. }



**INTERNATIONAL AND COLONIAL EXHIBITIONS.**

ANTWERP IN 1885—LONDON IN 1886.

IT is the intention to have a Canadian representation at the International Exhibition at Antwerp, commencing in May, 1885, and also at the Colonial and Indian Exhibition in London in 1886.

The Government will defray the cost of freight in conveying Canadian Exhibits to Antwerp, and from Antwerp to London, and also of returning them to Canada in the event of their not being sold.

All Exhibits for Antwerp should be ready for shipment not later than the first week in March next. These Exhibitions, it is believed, will afford favourable opportunity for making known the natural capabilities, and manufacturing and industrial progress of the Dominion.

Circulars and forms containing more particular information may be obtained by letter (post free) addressed to the Department of Agriculture, Ottawa.

By order,  
**JOHN LOWE,**  
Secy., Dept. of Agric.

Department of Agriculture,  
Ottawa, December, 19th, 1884. }

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A second-hand "Ingersoll" Rock Drill, three inch cylinder, with couplings, &c. Any person having one for sale will please communicate with the publishers of the CANADIAN MINING REVIEW.



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SEALED TENDERS, addressed to the undersigned and endorsed "Tender for Caisson, Graving Dock, B.C.," will be received at this office until Monday, the 1st day of June, 1885, inclusively, for the construction, erection and placing in position of a

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According to plans and specification to be seen at the Department of Public Works, and on application to the Hon. J. W. Trutch, Victoria, B.C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque for the sum of \$2,000, made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

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## Canadian Mining Review

OTTAWA.

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*The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.*

*Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.*

*Mining news and reports of new discoveries of mineral deposits are solicited.*

*All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.*

*Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.*

The mining localities in Canada which are attracting the most attention at the present time are: The Beauce gold district and asbestos mines of the Eastern Townships; the phosphate deposits of the County of Ottawa, and the mica mines, of which special mention is made in this issue; the iron deposits of Central Ontario, and further west in the same province, on the north shore of Lake Superior, the rich gold and silver mines are attracting the attention of capitalists. Capital is being liberally invested in the coal mines of the Northwest Territories and in the petroleum fields contiguous to the Red Deer and Lesser Slave Rivers. Much attention is also being directed to the mineral resources of the Kootenay District in British Columbia where eastern capitalists have already taken up claims with a view to commencing active mining operations in the spring.

The present year promises to be one of unusual activity in the mining centres above referred to—many new and influential companies have been organized to operate the mines and a fair amount of capital is available for that purpose.

In this issue we publish the full text, with illustrations, of a paper by Wm. Boyd Dawkins, M.A., F.R.S., on the Phosphate Deposits of the Ottawa District, read before the Manchester Geological Society. Professor Dawkins is a geologist and mineralogist of high repute in England, and during his visit to Canada last summer with the British Association he took occasion to visit our phosphate mines and devoted

some time to a careful examination of the extent and the nature of the deposits. His opinions, therefore, expressed in the paper referred to, will be of interest to those who are engaged in the industry of phosphate mining.

A variety of mineral specimens collected in the vicinity of Ottawa has been received by Dr. Selwyn, Director of the Geological Survey of Canada, for the International and Colonial Exhibition, which opens at Antwerp in May. A fair representation of the product of the phosphate mines will be exhibited, and an apatite crystal, pronounced by Dr. Selwyn to be the largest ever discovered, has been forwarded by Mr. Allan, of Ottawa. Some very fine plates of Canadian mica, from the Pike Lake and Villeneuve mines, are also among the exhibits.

Lt.-Col. H. Dachesnay, Inspector of Mines for the Chaudiere District, and J. Obalski, Esq., mining engineer for the province, have devoted careful attention during the past year to the mineral products and the occurrence of economic minerals in the section of the country under their supervision. Their official returns are embraced in the annual report for 1884 of the Commissioner of Crown Lands of the Province of Quebec, from which are published extracts in this issue referring to the occurrence of gold, asbestos and petroleum.

The annual report of the Minister of Agriculture for 1884, extracts from which are published in another column, contains special reference to the phosphate industry. It is strongly advocated in the report that the manufacture of super-phosphate should be engaged in in Canada, and in this we firmly concur.

The *Iron Trade Review*, Cleveland, O., in a recent issue, calling attention to the United States foreign ore competitors, remarks that Canada, as yet, does not appear as a formidable competitor, her shipments for the fiscal year under review being 29,125 tons, though for the calendar year they were about 50,000, but adds that it would not be surprising if Canada's shipments of iron ore into the United States during the fiscal year 1884-5 advanced to 200,000 tons.

Dr. Bell, Assistant Director of the Geological Survey, has been elected a member of the American Institute of Mining Engineers.

Prospecting continues at the Marlow silver location in the Province of Quebec. Four good veins have already been struck ranging from 10 to 20 inches thick, from which samples have been taken that have assayed 20 ounces up to 250 ounces of silver per ton.

The machinery for the Winnipeg and Northwestern Petroleum Company is lying in Winnipeg awaiting transportation to the wells. This machinery is suitable for boring to a depth of 2,800 feet.

## Canada's Phosphate Industry.

The activity which has prevailed at the phosphate mines in Ottawa County during the past year continues unabated, and notwithstanding that the market abroad has been more or less sluggish for the past six months or more, there is no disposition on the part of mine owners to check the output of the mines—on the contrary, they are working their properties, in most cases, to their utmost capacity and many thousands of tons of mineral are awaiting transportation. Owing to the construction of the Buckingham branch of the Canadian Pacific Railway, but a small quantity of mineral has been forwarded during the winter months. At the terminus of the railway commodious ore-bins have been erected on the bank of the Du Lievre River to receive the phosphate which will be carried in scows from various points on the river, contiguous to the mines, and with the opening of navigation there will begin a busy scene between the High Falls and the railway terminus. Mr. Lomer, of Montreal, with his usual enterprise, has built a suitable steam tug, which will be available by the time the ice has disappeared from the river, and two scows of seventy-five tons capacity each, to be used exclusively for the transportation of phosphate. Mr. Lomer has contracted to carry the output of the principal mines, adjacent to the river, to the railway at a rate per ton that will greatly reduce the cost of transportation as compared with what it has been formerly. The facilities now offered for forwarding the output of the Du Lievre district from the mines to Montreal are such as to render winter hauling practically unnecessary, and will insure its transportation, irrespective of broken and unfavourable weather, from the opening until the close of navigation, and the cost of delivering phosphate in Montreal is now reduced to a minimum.

It is expected that the quantity of phosphate that will go forward this year will be several thousand tons in excess of last year's production and the quantity that has already been mined, and the present appearance of the mines, justifies such a conclusion. The chief contributors to the general output, and the approximated contribution of each, are:—

The Phosphate of Lime Company, 7,000 tons; Union Phosphate Company, 4,000 tons; Dominion Phosphate Company, 3,000 tons; W. A. Allan, 2,000 tons; Ottawa Phosphate Company, 5,000 tons; Du Lievre River Phosphate Company, 1,500 tons; and Messrs. McLaurin & Blackburn (Templeton), 3,000 tons. If this estimate is approximately correct, with the addition of the output of the less important mines, the production of phosphate in the County of Ottawa for 1885 will doubtless aggregate 28,000 tons. Year by year more attention is being given to careful cobbing; and this season's shipments are likely to be of a higher standard than those of any former year. It is quite certain that a large proportion of the output will run over 80 per cent., while some will go as high as 84 and

85 per cent., notably that from the Little Rapids mine. That this careful dressing of the ore should be kept up is very important, and as mine owners have had sufficient experience now to know how necessary such precaution is, if they wish to secure high prices for their shipments, it is not likely that they will become again careless on this point as they have been in the past.

PHOSPHATE QUOTATIONS.

The most recent advices from abroad quote Canadian phosphate at 1s. 1½d. per unit for 80 per cent., with a fifth of a penny rise, but as there is none offering at these figures this can hardly be quoted as the market price. It is thought that prices will improve with the opening of navigation when phosphate begins to go forward.

ANNUAL MEETING.

The annual meeting of the shareholders of the Intercolonial Coal Mining Company (Limited) took place at the company's office, 199 Commissioner street, Montreal, on the 4th inst. The statements of account for the year ended December 31st, 1884, were submitted to the meeting and considered as very satisfactory. The quantity of coal marketed during that time was 114,882 tons. The following gentlemen were elected directors of the company for the ensuing year:—Messrs. Gilbert Scott, H. A. Budden, Robert Anderson, D. L. Macdougall, James P. Cleghorn, Peter Redpath, Alexander Gunn, Henry J. Tiffin, and W. M. Ramsay. At a subsequent meeting of the board Messrs. Gilbert Scott and Henry A. Budden were re-elected president and vice-president, respectively, and Mr. W. J. Nelson reappointed secretary of the company.

Huronian Mining Co.

A directors' meeting of above company was held at their office in this city on Monday, the 23rd inst., Jas. McLaren, Esq., President, in the chair. The question of continuing or suspending work was discussed. It was finally decided to place the property and plant in the market, not for want of faith in the productiveness of the mine, but for the reason that the distance to the property was too great to enable the directors (all being residents of this city) to give its working the personal supervision necessary to a mine's success.

We look upon this property as one of the most valuable in the Lake Superior district, and already we hear of a syndicate of American capitalists bidding for it.

St. Onge Gold Mining Co.

An organization meeting of above company was held at their offices in Quebec on Thursday, the 26th inst. W. A. Allan, of this city, was elected President. The properties acquired by this company in the Beauce district are being thoroughly and practically developed. Already three shafts have been sunk and the gravel washing at 150 feet from surface has proved very rich. It is the intention of the company to put a large force of men on when the season for washing begins, and we predict ere many months a boom for that district such as California and Australia had in their early gold discovery days.

On Some Deposits of Apatite Near Ottawa, Canada.

By PROFESSOR W. BOYD DAWKINS, M.A., F.R.S.

Read before the Manchester Geological Society, December 2nd, 1884.

1. DESCRIPTION OF MINES VISITED.

The Apatite Mines of Canada deserve more than a casual notice, not merely on account of their economic value, but because of the interesting facts which they yield, throwing light upon the history of mineral veins in general. It was my good fortune in September last to have visited, in company with the Bishop of Ontario and Messrs. Allan, Smith, McIntyre, and Grant,\* some of those in the district of Buckingham and Portland, and the following communication to the Society is the result of my observations, combined with those published by Dr. Harrington in the *Report of the Geological Survey of Canada, 1877-78*.

The district to which it refers is that known as the North Ottawa Phosphate Region, and those parts of it which I have examined consist of a cluster of mines on the Rivière du Lièvre, about eighteen miles above Buckingham, a station on the Canadian Pacific Railway to the east of Ottawa.

On getting out of the train at Buckingham, a drive of four miles along a road almost impassable from the depth of the ruts, took us to a tiny wharf and we embarked in a little steam yacht, which swiftly carried us up a noble river, about as broad as the Thames at Richmond, and flowing between bold rocky hills covered with trees glorious in the bright colours of autumn. We land and make our way along a track leading up to one of the wooded spurs, which showed as we left the river behind us, in the large blocks of vein stuff and mica lying in the ruts, that we were approaching the mines. The first vein which we examined is exposed in a shallow working at the outcrop and is filled with massive apatite containing bunches of black mica of the species known as phlogopite. The mine in work some three-quarters of a mile higher up is situated in a vein from twelve to fourteen feet wide, (Fig. 1, No. 3 of the following list), and filled with various materials, apatite, mica, pyroxene, calc-spar, &c., the apatite varying in thickness from two to fourteen feet. The sides of the vein are in some parts clearly defined

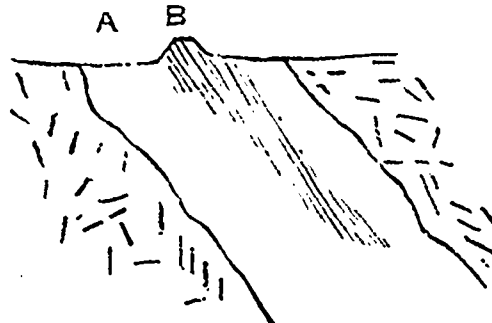


FIG. 1. Mr. Allan's Mine, No. 3 of list. A. Apatite and other minerals. B. Mica (Phlogopite).

\* I take this opportunity of thanking the three first of these gentlemen for their courtesy in arranging for me to visit the mines and to obtain specimens.

from the surrounding rocks, while in others they shade off into the pyroxenite rock of the district. It is a true fissure vein with a hade of 57° to the East. The workings had been carried on to a depth of about 140 feet from the surface, a greater depth than any other similar mine in the country. They were wet in some places, and the apatite was so decomposed as to take the form of pure sea-green sand, soft enough to be dug out. After examining the outcrop of another vein close by (No. 4 of the subjoined list) we visited the Emerald Mine some two miles away, where open workings had been carried on on a large scale, and galleries had been driven to some distance into the rock. The vein here was from twelve to thirty feet thick, and filled with various minerals, among which apatite and calc-spar predominate. In Fig. 2 a portion of the vein is represented about thirty feet thick, as it appeared on our visit, one side of it being filled with massive apatite, and the rest with calc-spar, in which crystals of apatite, some of gigantic size, were scattered irregularly. Most of the largest and most perfect crystals of

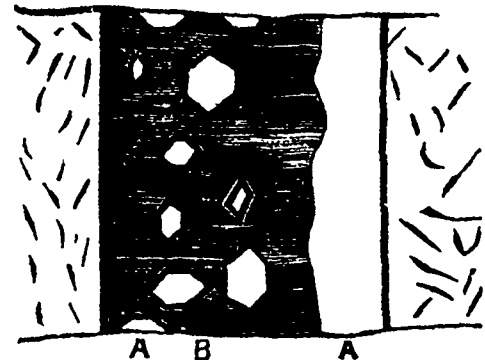


FIG. 2. Apatite Vein in Emerald Mine. A. Massive Apatite and Apatite Crystals. B. Calc-spar.

apatite have been obtained from this mine, some weighing, as Mr. Allan informs me, as much as 1,000 lbs. In one place the vein is intersected by a dyke of igneous rock, probably of dolerite, which is of later age than the vein, since it fills a fault by which the vein has been dislocated.

2. THE DIRECTION OF THE VEINS IN THE NORTH OTTAWA PHOSPHATE REGION.

The apatite veins which I examined, Nos. 3, 4, and 9 of the following list, do not agree in the direction of their strike or bearing, and when they are compared with others in the North Ottawa Phosphate Region described by Dr. Harrington in the Report above quoted, page 6, it will be seen that in the district generally they have no uniform direction. The predominant strikes are East and West, N.E. and N.W. by W.

BEARING OF APATITE VEINS IN NORTH OTTAWA PHOSPHATE REGION.

- 1. Portland ..... N. 15° W.
- 2. Buckingham ..... N. 45° E.
- 3. Portland ..... N. 60° W.
- 4. " ..... N. 40° E.
- 5. " ..... N. 55° W.
- 6. " ..... N. 30° W.
- 7. " ..... N. 15° W.
- 8. " ..... N. 5° W.

9. Portland	E. & W.
10, 11, 12. Templeton	E. & W.
13. Templeton	N. 85° E.
14. "	N. 78° E.
15, 16. "	N. 45° E.
17, 18. "	N. 35° E.
19. "	N. 17° E.
20. "	N. 67° W.
21, 22. "	N. 60° W.
23, 24. "	N. 40° W.

3. THE VEINSTUFF.

The apatite occurs in the veins generally in a massive crystalline form, green, blue, or brown, and sometimes glassy, or granular. It also occurs as large independent crystals shooting from the side of the vein. Sometimes, as in the Emerald mine, the crystals are large, perfect at both ends, and completely enveloped in calc-spar. It contains, according to Mr. Hoffman's analysis, tribasic phosphate of lime, 85.241\* to 89.810; fluoride of calcium, 5.860 to 7.929, besides other constituents, for which reference may be made to the *Report of the Geological Survey of Canada*, 1877-8, p. 10 B. In comparison with European apatites it stands thus:—

Tribasic Phosphate of Lime, Arendal, Norway	92.189
" " " Greiner, Tyrol	92.100
" " " Murcia, Spain	92.060
" " " Tokovaia, Ural	9.768
" " " Studianka, Russia	91.646
" " " Ottawa, mean of 7 analyses	87.521
" " " Estremadura, Spain, mean of 2 analyses	81.583
" " " Staffel, Nassau	75.273

It is, therefore, a high-class and valuable mineral, and, in my opinion, is one of the most important of the mineral resources of Canada.

The calc-spar is coarsely granular, white or flesh-coloured, and intimately associated with the apatite, sometimes completely surrounding the crystals, and at others forming alternate layers. In some cases, as in the specimen on the table, it has a stalagmitic surface, and in others has been deposited along with quartz and other minerals in drusy cavities.

The mica, of the phlogopite species, and dark in colour, is also intimately associated with the apatite, sometimes being in large masses in the centre of the vein, or in others lining the sides of the vein, or coating the crystals of apatite. Among other minerals which I observed in the veinstuff were pyroxene, zinc-blende, and pyrite both in cubes and in octohedra. For further details as to the minerals associated with apatite, reference may be made to Dr. Harrington's admirable essay.

4. THE ROCKS TRAVERSED BY THE VEINS.

The rock (Pyroxenite of Hunt=Hypersthenite of Dana) traversed by the veins which I examined consists of a bright crystalline and massive schist, composed to a large extent of pyroxene (augite), more or less altered, mica, orthoclase, trichitic feldspar, and apatite. It contains, according to Dr. Harrington, subordinate layers of quartz. Were it not that it is bedded it would pass muster as an eruptive rock.

\* The lower percentage, 74.241 of his analysis, No. 7, seems to be taken from an impure sample, and to be an exception to the rest of his results.

Looking, however, at that fact, and the further consideration that it is associated with quartzites and altered limestones, it is, in my opinion, an altered rock belonging to the Archaean (Laurentian) series, which ranges over the vast region north of the Lakes and of the St. Lawrence River, and which, according to Sir W. Dawson, is not less than 30,000 feet in thickness. In classification it goes with the Laurentian hornblende gneisses. According to Dr. Harrington, both limestones and quartzites are traversed by veins of apatite in the North Ottawa Phosphate Region at Templeton, which I had no time to visit.

5. HISTORY OF THE VEINS.

In dealing with the very much debated question as to the history of the apatite veins, the following points seem to me the most important:—

(a) The veins are in some cases sharply defined, and have evidently been deposited in a series of irregular fissures striking across the rock in various directions. (See Figs. 1 and 2.) Sometimes the vein-stuff shades off in the pyroxenite, as it might reasonably be expected to shade off on the hypothesis that the deposit took place under conditions of heat and enormous pressure in the presence of water. These conditions are proved to have existed from the profound alteration of the Archaean rocks from the fragmental to the crystalline state.

(b) The character of the vein-stuff is such as is usually found in fissure-veins. In Fig. 3 it presents a banded structure, formed by alternate layers of apatite and pyroxene. In other



Fig. 3. Vein stuff from No. 3, nat. size, Portland. A. Apatite. B. Pyroxene.

cases layers of apatite and of a stalagmatic calcite alternate, and in one specimen on the table an angular fragment of quartzite is enveloped in vein-stuff composed of mica, pyroxene, and apatite. These two characters are found together, so far as I know, only in true fissure veins, and are well known to practical workers in mineral veins generally.

(c) The apatite occurs disseminated through the pyroxenite rock in minute granules, and it is therefore argued that it has found its way into the veins by a mere process of segregation. It seems to me more probable that both rocks and veins have received their charge from some

common deep-seated source by hydrothermal action, while both were sunk deep beneath the surface, and the heat and pressure were sufficient to allow of apatite and the other minerals in the vein being deposited by water.

(d) The surfaces of some of the crystals of apatite present traces of hydrothermal action in their rounded angles and honeycombed surfaces, as in the specimens on the table. Solution might very well go on in one place while deposition was going on in another. The presence, too, of perfect crystals of apatite completely embedded in calc-spar, as in Fig. 2, can only be accounted for on the hypothesis that the vein was filled with a pasty mixture of apatite and calcite which allowed of the former developing a perfect crystalline form, the calc-spar matrix being sufficiently compact to keep the growing crystal from sinking to the bottom of the fissure. Had the fissure been empty the apatite crystals in this case, as in most others, would have been imperfect, and would spring from the side of the vein. This pasty condition of the vein-stuff is only explicable, in my belief, by hydrothermal or aqueo-igneous action.

(e) Nor are we without proof that the vein-stuff itself has been in a state of movement while it was in a pasty state in the crumpling and distortion to which the crystals of mica have been subjected. The specimens on the table have been obviously distorted by the movement of the surrounding matrix after their development as crystals.

From these facts it may be concluded that the veins of apatite in this district were formed in fissures in the Archaean rocks by hydrothermal or aqueo-igneous action under conditions of heat and pressure of the same general sort as that by which the rocks themselves have been affected, and by which the sandstones have been converted into quartzites, the muds and sandy clays into schists and crystalline rocks and the limestones into crystalline calcite associated with serpentine.

These impressions of a hasty visit to the district in question are laid before the Society not merely because they relate to a large and rapidly developing mining industry in Canada—the export last year being 14,478 tons, and the estimate for this being 23,000 tons—but because they are of local interest, since the products are largely used in Lancashire.

The following note relating to the physical characters of this important mineral, and the localities where it occurs in the British Isles, is added for the information of those who may seek for it:—"Apatite, crystalline phosphate of lime. Hexagonal, often hemihedral, occurs in six-sided prisms terminated by one or more planes, or the prism is terminated by a six-sided pyramid, and the lateral edges are sometimes replaced. Colours usually pale, and most commonly white, yellowish white, wine yellow, green, blue, or bluish green, and red, which are sometimes intermixed in the same crystal.



Externally it is splendent: internally the lustre is shining and resinous, approaching to vitreous. Transparent to opaque: cross fractures uneven, approaching to small conchoidal. Hardness, 5. Specific gravity, 3.25.

*Blow-pipe*.—Fusible with difficulty on the edges: with borax forms a clear globule, and in sult of phosphorous dissolves in great quantity, affording a transparent glass, which, when nearly saturated, becomes opaque on cooling, and presents crystalline faces."

*Localities*.—*English*: Cornwall, of a greyish-blue, at Stenna Gwynne, near St. Austell; St. Michael's Mount; Huel Kind, near St. Agnes; Fowey Consols and Huel France, near Tavistock. Cumberland, at the foot of Brandygill, Carrock Fells. Devonshire, at Bovey Tracey, in crystals sometimes two inches long, associated with black tourmaline. *Scotch*: Dee side, in Aberdeenshire. *Irish*: Near Kiltroot, Co. Antrim, in granite; near Hilltown, Dublin; and at Killiney Hill, in limestone. *Bristow's Glossary of Mineralogy*. It has not yet been discovered in paying quantities in the British Isles.

### The Late Sir William Edmond Logan.

On the 26th of March Dr. Bell, assistant director and the senior geologist of the staff of the Canadian survey, delivered a lecture before a large audience in Montreal on "Personal Reminiscences of the late Sir W. E. Logan." Dr. Bell had been obliged to postpone the lecture, which was one of the Sumerville course in connection with the Natural History Society, on account of a severe cold, and in the meantime he kindly gave a rehearsal of it in St. James' hall in Ottawa on the 10th instant, at the request of the staff of the survey and other citizens. As the subject is one which we are sure interests our readers we give the following report of the lecture:—The history of the Geological survey of Canada was inseparably connected with that of the life of Sir William Logan. This survey owed its origin to representations made by the Natural History Society of Montreal and the Literary and Historical Society of Quebec. Acting on these, the first Parliament of the united provinces of Upper and Lower Canada voted £1,500 sterling to commence the work and Mr. Logan was appointed Provincial Geologist in 1842. Subsequently the grant was increased to £2,000 annually, but it was not till near the close of Logan's administration that the amount exceeded \$20,000 a year, and the average annual grant during his time may be said to have been only about \$15,000. This fact should be borne in mind when we consider the great things which Logan accomplished.

The lecturer did not propose to give a history of Logan's life, which had been well done by Dr. Harrington, nor did he intend giving a description of his personal qualities, but would relate a series of incidents and anecdotes illustrative of the principal points in a man's character, and leave each to form his own judgment. Dr. Bell's connection with the survey began early in 1857, and he was associated with Sir William from that time until the latter left the country, a period of 17 years, during which he had opportunities of seeing him under a great variety of circumstances.

Logan's ardent devotion to duty both in the office and the field were well calculated to inspire enthusiasm in others, and thus a large amount of work was performed by the small staff. Even in the city he commenced his labors early in the morning, and after a short interval for breakfast continued without intermission till six in the evening, when he dined, returning to the office again and working till past midnight. In addition to his daily or more frequent round of visits to every member of the staff, he kept all the accounts with his own hand, carried on an extensive correspondence, plotted the surveys he had made during the summer, and constructed his own original maps, wrote his reports, revised those of his assistants, examined all the fossils, minerals and rock-specimens collected during the year, studied the reports of other geological surveys and the new geological books generally, while the interruptions caused by visitors, to whom he was always accessible, occupied a considerable part of every day. For a number of years four manuscript copies of the various annual reports required to be made in order to comply with the requirements of the time, and all these Sir William Logan wrote out with his own hand, a task requiring the utmost patience to endure.

The room in the survey building in Montreal in which most of Sir William's work was performed, and which also served him for a bedroom, was plainly and scantily furnished. It had no carpet on the floor, no screen or curtain at its single window, while his camp blankets, spread on a folding chair, served him for a bed. Some of his field instruments and the clothes he wore in camp might be seen hanging on pegs around the wall. He paid little attention to dress even in the city, and he made the same coat and waistcoat wear for so many years that they seemed as familiar to his friends as the man himself. A wing to his unpretending dress and style he escaped recognition even by many old citizens of Montreal. When working in the country he put up at the farm houses and wayside taverns and paid so little attention to his personal appearance that strangers would scarcely believe he was Sir William Logan at all. Several very amusing anecdotes were here related by the lecturer, showing the mistakes and inconvenience which arose from his "seedy" appearance. These stories will not bear condensing, and we only regret that we have no space to give them at length. Some laughable accounts were next given of how, on various occasions, he had been treated as a lunatic from ignorant people not comprehending his motives and actions.

Wherever he walked in the country (and he seldom hired a conveyance) he counted his steps and took bearings of the road or of his track by compass, and in this way surveyed thousands of linear miles more accurately than would be supposed possible. His field books show the great care with which he noted and sketched the features he would represent on his maps. His instrumental surveys were models of accuracy, and several instances were given of the great care with which he performed these surveys. He was not only a first-class topographical surveyor, but a very neat and skillful draughtsman, as proved by his maps. Among the surveys which he performed were that of the Ottawa river, a traverse of the Gaspé peninsula, a great part of the county of Argenteuil, the region opposite the city of Quebec, the neighborhood of Missisquoi bay, the townships around Richmond and Danville, two whole summers having been spent in a single township. These and other surveys which were referred to, combined both the topography and the geology, and the great pains which Logan always took to

secure accuracy, gives everyone the fullest confidence in his results. In 1862, when a person by the name of Marcon called in question the work of some of Sir William's assistants, he took up the cudgels in their behalf, as he always did, and effectually repelled the accusation. This was one of the causes of the noted *esprit de corps* of the survey in Logan's time. Other causes of this feeling were his sense of justice, the care with which he kept his word, and the pride he took in his staff, simply because they were his own men. He did all he could in their behalf, and they in return supported him and aided very materially in building up his great reputation. A number of instances were given of Logan's carefulness in matters of detail and in looking after the welfare of his assistants. He took pleasure in giving them full credit for their labors and was lenient to their failings.

In the field, whether in settled districts or in the woods, the amount of physical labor which Logan underwent was very great. When working miles away he never thought of his boarding place or his camp until compelled by the darkness to close his note-book and walk back to his supper and bed. After his evening meal, instead of taking his much-needed rest, he would spend hours plotting his maps.

As to religious matters, Logan made no parade of piety, although his everyday life was an exemplification of practical religion. He treated the clergy of all denominations with much respect and among them were many of his principal friends. His parents belonged to St. Gabriel (Presbyterian) church and Sir William used to tell an amusing story of how, when a very small boy, he grabbed the coppers on the collection plate the first time they took him to that place of worship. Logan did not believe in indiscriminate generosity, but the lecturer mentioned several instances proving that he was kind hearted and a gentleman of refined feelings. He was not a time-server nor a respecter of persons, but observed the same respect for the feelings of all. On the occasion of Her Majesty's visit to the Canadian section of the International Exhibition of 1855, the Queen was much pleased with his charming conversation, and his sincere and independent manner, and shortly afterwards she conferred on him the honor of knighthood for his great services to science and his native Canada.

Sir William remained a bachelor, although from the anecdotes related by the lecturer of the interest the ladies took in him, it would appear that he might have found a wife had he desired to do so. He was not, however, by any means unsociable, and his good stories, songs and jokes always made him the centre of attraction. He was as ready-witted as Sir John Macdonald, and had something appropriate to say for every occasion. No one enjoyed a little harmless fun more than he, nor sympathized more heartily with the youthful frolics of his assistants or men, as we may judge from the illustrations recited by the lecturer. His keen sense of humor induced him occasionally to participate in practical jokes at his own expense.

During Logan's lifetime, Marcon was his chief detractor, but since his death Whitney, Wadsworth and others have assailed his reputation. If some who might take his part seemed indifferent, he had in the lecturer one witness, at all events, ready to stand up for him. While multitudes of "self-seeking" reputation hunters went to their graves "unwept, unhonored and unsung," Sir William Logan's death was keenly felt by thousands, and his memory would be ever green in the hearts of those who knew and loved him.

## PHOSPHATE OF LIME.

FROM THE ANNUAL REPORT OF THE MINISTER OF AGRICULTURE FOR 1884.

In my report last year especial attention was directed to the importance of the phosphate trade, and the proportions it promised to assume in the near future. Attention was called to the fact that Americans were carefully looking after property in Canada where they could obtain the raw material, and this desire on their part is being still more strongly evidenced. Canadian phosphate maintains its position in the markets abroad, and the output during the past year has been large. Some 23,000 tons of this material were shipped from Montreal in 1884, against 19,000 tons in 1883. Of this amount, the mines of Ottawa County furnished 20,353 tons, whilst the balance went from the section of country lying north of Kingston, the only two localities in which this mineral is worked. The season has proved favorable to those engaged in the phosphate trade. Prof. Boyd Dawkins, an eminent geologist, who, when out here with the British Association, visited the Ottawa County mines last autumn, stated, in a paper read by him at Manchester, on his return, that in his opinion phosphate was "one of the most important resources of Canada." The effects of this industry on the country generally, and especially those districts where its mining is carried on, are most beneficial, as the capital expended by its agency is considerable.

The use of this material as a fertilizer, when converted into superphosphate, cannot be too strongly urged on our farming population, and the advantages it offers in renewing lands worn out by perpetual cropping, in the absence of ordinary manure, the want of which is too often apparent in districts where cattle raising is not carried on, cannot be too often impressed. In those parts of Europe where the sugar beet is largely grown—Belgium and Denmark, for instance—no fertilizer has been found equal to phosphate, and the same remark might well be applied to the grain producing farms of our older Provinces. The rigid inspection to which the crude material is subjected in England tends greatly to keep up the standard of our shipments, and the high percentage of Canadian phosphate will always secure for it a foremost place and an eager demand. Prof. Dawkins, comparing the phosphate obtained from various countries, states the percentage that Canada yields out of a mean of analyses, is 87.52 of tribasic phosphate of lime.

The question has not yet been solved whether the raw material pulverized will give beneficial results to the soil by its application, and till this fact has been ascertained the crude phosphate will continue to be shipped to the place of manufacture. The establishment of works for its conversion into superphosphate, contiguous to the natural deposits, would prove of immense advantage, as the material thus converted would be far more likely to be made use of by our resident agriculturalists, and the transport of bulky phosphate would be resolved into shipment of a substance commanding a far higher price. The advantages obtained by foreign manufacturers would in that case be gained by Canada, and an industry might be added to those already existing, which would materially add to our prosperity.

From information obtained, it is expected that the output of phosphate in 1885 will be much larger than in any previous year, as great improvements have been made at the mines,

and appliances have been brought to bear by the various companies working them which will materially aid their efforts, and add largely to the products hitherto obtained by imperfect means.

It seems to me a matter of regret that no definite action has yet been taken in regard to the conversion of crude phosphate into superphosphate ready for use. If the manufacture of the prepared fertilizer was carried on in Canada, much larger returns would be obtained for the shipments of it made to Europe, and a considerable saving would occur in the cost of freight, as under the present conditions, however carefully the system of collecting the crude material is carried on, there are still quantities of foreign matter associated with it, which are valueless when separated by the manufacturer. I have ascertained that the mineral from which the acid requisite for the converting of phosphate into superphosphate could be extracted, is present in proximity to the phosphate itself, but no steps appear to have been taken towards the manufacture of this commodity, either for home use or for foreign export. I am, however, in hopes that with the attention the phosphate mines have received within the past year, both from members of the British Association who visited them, as well as from capitalists with a view to investment, and as the output of the crude material increases with the development of new mines, this important question of its conversion into a form ready at once for the use to which it is to be applied, will occupy the serious attention either of those at present engaged in phosphate mining, or of those who might make its manufacture a separate branch of industry. It is almost needless for me to add that the establishment of such works amongst us would further recommend itself as being another means for furnishing employment to the labour of our own country.

APPENDED TO THE MINISTER'S REPORT IS THAT OF THE GOVERNMENT AGENT AT LIVERPOOL, from which we extract the following:

The quantity of mineral phosphates imported this season from Canada is estimated at 20,460 tons, which is an increase of 3,000 to 4,000 tons on last year, and exceeds that of any previous year since phosphates have been exported from Canada. The quality has also improved, although much more could be done in dressing at the mines to improve it. Prices have scarcely been maintained this year, 70 per cent. having touched 9½d. per unit, ex ship at Liverpool; 75 per cent., 11d., whilst 80 per cent. has not been offering. Other imports have been pretty equal to the previous year, especially Charleston land phosphates, which have been selling ex ship delivered U.K. port at 11d. Belgian phosphates have come in pretty freely and continue to sell at very low prices, both for present and next year's delivery. Spain has not forwarded so large a quantity this year, on account of temporary suspension of some of the mines, but it is expected that the imports from that quarter will be quite up to the average next year. Prices of phosphates are considered low, notwithstanding the increased demand, therefore a decided improvement may reasonably be expected.

The total value of Canadian mine products in 1884 was \$3,247,092, while that of 1883 reached but \$2,970,886.

Lead veins are thickest in limestone, thinner in sandstone, and thinnest in slate. The latter, however, contains the greatest percentage of silver.

## MICA MINING IN CANADA.

The most important mines in operation at present are the *Pike Lake* mine, in Burgess, and the *Villeneuve* mine in the county of Ottawa. The former is becoming more and more productive, and during the past month has yielded abundantly. The crystals at the *Pike Lake* mine are, in many cases, of enormous size, numbers of them being capable of producing plates twelve inches square. From some of them even larger dimensions have been obtained. Shipments are being made monthly from the mine, and although but a small force of miners is employed, the yield is sufficient to supply a large demand and the property is being worked at a large profit.

The *Villeneuve* mine has not yet been developed to the same extent as *Pike Lake*, but a large quantity of mica of very excellent quality is being taken out. As development proceeds the crystals are found to increase in size and to be more regularly formed. Several hundred pounds of merchantable mica have already been taken out and await transportation. The output is increasing daily, and the product of this mine will be sufficient to supply a fair portion of the demand for Canadian consumption.

These two mines are being steadily worked under the management of practical men, and shipments of mica, cut and ready for the market, will be made each month hereafter.

## GOLD MINING IN BEAUCE.

During the past year there has been a marked revival of interest in the alluvial gold deposits in the Beauce district, and quartz mining has started up with encouraging results, both quartz and alluvial mining promising to become permanent and very remunerative industries. The annual report of the Commissioner of Crown Lands for the Province of Quebec, for 1884, embraces the report of the Inspector of Mines for this district, which contains interesting information regarding the operations of the several companies and individuals engaged in gold mining in the various localities in the Beauce district. The inspector reports that although the year 1884 has not witnessed any great revival of the mining industry in the Beauce gold region, those who have continued their operations have been much encouraged by the results obtained in the alluvial mines, while those who have begun the opening up of quartz veins have found immense beds containing both gold and silver in paying quantities.

The Canada Gold Company, for instance, spent the greater part of the season in sinking nine trial shafts in as many different veins of quartz, and with the knowledge so acquired can now proceed intelligently in the development of their immense property. The fact of their acting with so much precaution should not be regretted, for although the working of the mines in this part of Rigaud Vaudreuil has thereby been retarded for a year, it may prove to have been in the interest of the province as well as in that of the company. For if work had been begun without previous examination upon any quartz vein whatever and the result had proved unfavourable what a bad effect it would have had upon the character of their valley as a gold-bearing district!

Messrs. Fenton and Dupuy also devoted the whole of the summer and part of the autumn to prospecting operations in the upper quartz region, and say that they found some very rich veins in the high lands of the township of Cranbourne.



Captain Richards continued throughout the season to work upon his alluvial claim in the St. Charles concession of Rigaud Vaudrenil, and was preparing to begin operations in January upon the quartz lode known as the Loabier vein in the first range of St. Francis. A specimen of the quartz from this vein sent to New York yielded, according to the official report of Mr. Michel, at the rate of \$15 in gold and \$22 in silver to the ton; and upon another assay by Mr. Calvin appeared to contain \$106 worth of gold per ton.

Several companies of miners had also been washing on the Gilbert last year; among others, McKee & Co., O. Dion, C. Corpal & Co., H. Powers & Co., and if they have not made fortunes, which would have been surprising with the means employed, they at least had many excellent days.

Messrs. McArthur Brothers, who for a long time worked with success upon the old St. Onge claim in the same St. Charles concession, but had suspended operations during the progress of the suit respecting mining rights, have passed a lease with the proprietors and will soon be at work again.

At the River des Plantes the "Canadian Co." did a large amount of work last summer, and are excavating a tunnel and drain which will enable them to reach and work the bed of auriferous gravel so deeply buried under the steep banks of this river, which flows entirely over rocks of the lower Silurian strata about a mile north of the limit of the upper Silurian formation, where the Gilbert has its course.

At St. George, Messrs. Allan & Humphrey, having acquired the property of Messrs. St. Onge & Brothers, had the misfortune to lose their third shaft, which, at a depth of 154 feet, had just reached the surface of the gravel. This loss is attributed to two thick beds of very fine sand through which the shaft passed. They have gone to work again upon a new system, and having already overcome all difficulty, expect to reach their goal within a short time. The new shaft is only a few feet distant from the old one, so there is no doubt it will strike the same bed of gravel, a single pan of which taken from its surface, on the very day the old shaft was abandoned, yielded thirty-six particles of gold.

About twenty miles from the last-mentioned workings is situated the famous Armstrong mine in the valley of the River du Loup. Assays of specimens from this mine made at Quebec, in France and the United States attribute to the mineral an enormous value both in gold and silver, some of them yielding at the rate of over seven hundred dollars a ton. Pieces of quartz taken from the vein contain gold visible to the naked eye. Prospecting operations were resumed at this mine in November last under the direction of Mr. J. Fraser Torrance, a competent mining engineer, on account of a Canadian capitalist whose purse is always open for the assistance of enterprises of a sensible and patriotic character.

#### ASBESTOS MINING IN CANADA

This industry is carried on to a large extent in the townships of Coleraine, Thetford and Broughton, in the county of Megantic. Asbestos was originally discovered in 1877, in the township of Ireland, and the first workings were begun in the following year by Messrs. Johnston and Irvine, in Thetford. This branch of mining has advanced since then with giant strides, and between May and November of last year over 1,200 tons of asbestos were taken out of the seven mines in operation in Thetford and Coleraine alone. An eighth mine, in the

seventh range of Broughton, was also successfully worked and disposed of at a high price; while yet another was opened late in the fall in the sixth range.

As many as five hundred men were employed during last summer in these different mines.

The Government Inspector of Mines for the district reports that the mines or quarries appear to be inexhaustible; that they can give employment to thousands of workmen, that they can be worked with small capital; and that they have hitherto paid at the rate of a hundred per cent.; also, that the market cannot be overstocked as the supply is not equal to the demand from England, France, Germany, Italy and the United States. The ruling price obtained for the output of these mines last year was \$80 per ton. New uses for asbestos are being found every day, and Mr. Montpotit, in his excellent pamphlet, "*L'amiante est le million*," mentions the following: cloth, cordage, thread, packing for steam engines, paint, paper, pasteboard; it is used, he says, for lining crucibles, blast-furnaces and safes. In addition to this long list, it may be stated that for joints in water-pipes, or covering hot air conductors, it has no equal; that it renders buildings comparatively fire-proof when woven into sheets only one twenty-fourth of an inch in thickness and spread over the floors and stretched on the partitions like paper-hangings;—that it would render similar service in theatres, and that a fireman, completely clad in asbestos, with openings for the eyes protected by mica, might defy the flames.

This industry in the Eastern Townships has become one of much importance and the extent of the deposits renders it susceptible of increasing into one of great magnitude. It is expected that the output of the approaching season will be greatly in excess of that of any former year and the mineral has gained a world wide reputation for its excellent quality as compared with that mined in any other part of the world.

#### GYPSUM IN CANADA.

It may not be generally known how largely this useful mineral is developed in various regions in the Dominion and Newfoundland. In the latter province it forms high banks at Great Codroy Harbor, near Cape Ray, and at several places on the shore of St. George's Bay, some of it being of a white color, suitable for making stucco. In Cape Breton it is found all around the shores of Bras d'Or Lake, and on the outer shores at Lennox Passage, as well as along the Strait of Canso in the southern part of the island. In the same island it is abundant on the Gulf of St. Lawrence side, at St. Ann's Harbor, Mabou, Margaree and other places. Heretofore it has been shipped principally from Plaster Mines on Bras d'Or Lake, Baddeck, Lennox Passage and St. Ann's Harbor, but formerly large quantities were sent from Mabou. Great quantities of gypsum occur on the mainland of Nova Scotia near the Minas Basin, and it is largely shipped from the Port of Windsor. Large deposits are also found in the eastern part of New Brunswick, the principal shipping point being Hillsborough, on the Peticodiac River. The mineral is common on the Magdalen Islands, which belong to the County of Gaspé, but it is mostly of a gray color. In all these localities in the Lower Provinces the gypsum occurs in strata belonging to the Lower Carboniferous series. Comparatively small deposits of gypsum are met with along the Grand River, in Ontario, in the Onondaga formation. Being in an agricultural region, where it is in demand for hand plaster, it has

been mined more or less at Paris, York, Caledonia, Cayuga, Oneida, Mount Healy, &c. Much of it is white enough to be calcined for stucco, &c. Beds of gypsum have been found in boring for salt in the Kincardine and Goderich regions, where it occurs in the Onondaga formation also, but which is there overlaid by the Corniferous. Gypsum may be struck in borings anywhere in Ontario south-westward of a line drawn from the mouth of the Grand River, on Lake Erie, to the mouth of the Saugeen River, on Lake Huron.

To the north of the Great Lakes, gypsum is found in considerable quantities, at the White Banks on the Moose River; and it is reported to occur near the shore of James' Bay, between Moose Factory and Fort Albany. Traces of the mineral have been found near the south-west side of Lake Nipigon.

In the North-West Territories small quantities have been discovered in the Riding Mountains, and nodules and crystals may be found in the Cretaceous clay and marls in almost any locality throughout the North-West where these crop out. Ignorant people mistake the clear laminated crystals of selenite for white mica, and many a sensational story of mica discoveries has thus arisen.

At Peace Point on the north side of the Lower Peace River about 60 miles W.N.W. of Fort Chipewyan, on Athabasca Lake, the cliffs are about half composed of gypsum. Loose specimens of the mineral have also been picked up at the falls of Peace River, about 160 miles from its mouth.

Gypsum is also reported to be abundant just west of the great natural salt deposits of Salt River, on the west side of Slave River, about half way from Athabasca Lake to Great Slave Lake.

#### PETROLEUM.

INDICATIONS OF ITS EXISTENCE IN THE PROVINCE OF QUEBEC DESCRIBED BY MR. J. OBALSKI, GOVERNMENT MINING ENGINEER, IN HIS REPORT TO THE COMMISSIONER OF CROWN LANDS.

Mr Obalski in referring to these very important indications says:

In my study of the mineral products of the Province of Quebec, I have had occasion to remark a fact which appears to me of great importance. In the district about Three Rivers, that is, in the south part of the counties of Champlain, St. Maurice, Maskinongé, Berthier, Joliette, &c., some very considerable emanations of combustible gas have been noticed ever since the country has been inhabited. The places where these have been known to occur are St. Maurice, Pointe du Lac, Louiseville, St. Leon, Epiphanie, St. Paul, l'Hermite, St. Henri de Mascouche, &c., and on the south shore, St. Gregoire, county of Nicolet.

This gas has certainly some origin, which should be found in the petroliferous deposits existing in the subsoil. The country has been inhabited for over a hundred years, and it may be reasonably supposed that the same effects were produced long before. Dr. Dame, of Louiseville, has collected at a single point, which he calls the St. Peter well, as much as 8,000 cubic feet in twenty-four hours; and the same may be done at a number of points within a comparatively small space. It therefore seems to be rational to suppose that there exist large quantities of petroleum from which this gas is continually being formed, if there are not immense accumulations of gas of undiscoverable

origin, unless, indeed, it arises from solid matter.

These facts acquire greater importance when it is considered that on the whole of the north shore of the St. Lawrence between Quebec and Montreal, there exists a rocky formation called the Trenton limestone, and that wherever that limestone appears at the surface, as the *Pointe aux Trembles*, *River à La Rose*, *Chateau Richer*, &c., the cavities in it are seen to be filled with small quantities of veritable petroleum: that bituminous schists are found at *River à La Rose*, and other points; and finally that at certain points in a lower formation we find thin veins of a substance resembling anthracite, as at the Island of Orleans, Levis, St. Appolinaire, &c.

All these facts taken together tend to prove the existence in this region of substances whose base is carbon. Besides, the official geologists of the Federal government recognized the possibility, and even the probability of the existence of petroleum in this formation. Dr. Sterry Hunt, in his report for 1866, page 262, says: "The limestones of this formation may in some localities prove to be valuable sources of petroleum."

Sir W. Logan, in the *Geology of Canada*, 1863, page 136, says "the possibility of its occurrence in available quantities in some parts of the Trenton formation should not be lost sight of."

Considerable quantities of it have been found in the same formation in the Manitoulin Islands, province of Ontario.

It has been proved by investigation that petroleum can be found in considerable quantities only where the subterranean strata have been so folded or disposed as to form pockets or cavities in which it might accumulate. The incomplete study of the country yet made has not established the occurrence of such foldings in the strata, but in my opinion they may be presumed from the nature of the surface indications; and I consider that it would be highly advisable to have some borings made so as to discover the origin of the gaseous emanations above mentioned. It is possible that a cavity might be struck at the first attempt, but in any case it would be necessary to sink a certain number of trial wells, and a company spending about \$10,000 in this work would, I think, arrive at some definite result.

Attention is directed to another locality where Mr. Obalski observed strong evidences of the petroleum and on which he reports as follows:

Throughout the whole of the region comprised between *St. Paul l'Hermitte*, *l'Epiphanie* and *St. Henri de Mascouche*, emanations of combustible gas have long been known to occur, often rising from the ground in the company of salt springs. These emanations are similar to those which I have mentioned on several previous occasions, and arise from the same source; that is to say, I believe they are all due to the presence of bodies of petroleum in the subterranean limestone. The conformation of the land and other indications are the same as those at the places previously examined.

At the place called *Cabane Rouge*, on the land No. 3 of the cadastre of *St. Henri de Mascouche*, Messrs. Renaud Brothers and Dubois, began a boring of three inches in diameter. They traversed a bed fifty-four feet thick of blue, yellow and red clay, then sixteen feet of black sand and coarse gravel, and finally struck the schist rock at a depth of seventy feet. During the whole of the time the work was going on the escape of gas was regular and abundant. Operations were begun in the autumn of 1883, and resumed in the spring of this year. A remarkable circumstance, worthy of being recorded, then occurred. At the beginning of

June, on inserting the drill, the workmen met with a resistance which the efforts of four men were unable to overcome, and withdrew the instrument, upon which a violent gush of matter from the opening took place. For forty-eight hours, as I was told by the witnesses of the scene, a column of liquid, gas and stones could be seen issuing to a height of over fifty feet. The gas was of the same character as that previously reported on; the water very salt; and the stones, some of which were half the size of a man's fist, were composed of quartzites, limestones, black bituminous schists, various kinds of granite, &c., and generally in the shape of rounded pebbles. I was further informed that at the beginning of the discharge, a score or so of oily drops of petroleum were observed to fall, but were not gathered, as it was hoped that a larger quantity would be forthcoming. The boring has since been continued, but more slowly on account of the hardness of the rock.

These facts are all very important and merit serious consideration, in connection, however, with my previous reports.

I encouraged the enterprising prospectors to persevere, and it is to be hoped that they will be able to continue their labor in boring to a greater depth, and ultimately see it crowned by a discovery which will be of the greatest importance to the country if a vein of petroleum be struck, as there is reason to expect will be the case.

### The Mines North of Lake Superior.

There seems to be no doubt that Port Arthur is preparing for a mining boom on the opening of navigation. The reports coming from the working mines and recent discoveries in the new silver region, south and west of the township of Paipoonge, are certainly very encouraging. Several mines in that part of the country are in actual operation and producing some marvellously rich ore. Those adjacent to the township in the Rabbit mountain district have a large production considering the time they have been at work, and the difficulties they have had to contend with in the absence of a bridge across the Kaministiquia river and a proper wagon road. It is expected that these difficulties will be removed in the spring. If they are, the extensive working of the mines is assured, and access will also be given to a good agricultural and timber district as well. The *Thunder Bay Sentinel* points out that the construction of a proper wagon road and the *Thunder Bay Colonization* railway are much needed for the proper development of the country. The same newspaper in a recent issue refers to an examination which has just been made of the Silver mountain mine by three mining experts from Chicago. It is said that in the presence of these gentlemen a single blast put in a test pit upturned over \$6,000 worth of silver ore from less than a ton of the veinstone. Such ore is almost unprecedented and if the development continues as it has begun there is little doubt that the owners will receive the extraordinary prize of \$200,000 for which it is said the property has been bonded.

Log cabins are being erected on several localities in the neighborhood of these rich discoveries, teams are taking in supplies over the winter road before it becomes impossible, and preparations are being made for active development work in this region as soon as the snow goes off, on an extensive scale. The discoveries are not confined to any particular section of the new mining field, but they extend from the Kaministiquia and Slate rivers, where veins crossing them in the township of Paipoonge have been

found carrying silver, south to the international boundary and westward along it, a distance of over 40 miles. To the northwest of this silver region the gold formation adjoins that of the silver-bearing slates, and at various points valuable discoveries have been made.

Mines are at work on both sides of Pigeon river, the International boundary between the State of Minnesota and the Province of Ontario. On the Canadian side the Huronian Company has a very rich mine and a ten-stamp mill.

On this side of the boundary the gold is found in true fissure veins in the green slates of Huronian formation. The yield per ton is not claimed to be enormous but the gold is evenly disseminated in paying quantity throughout the veinstone and the veins are wide enough to admit of very large production. At the Huronian mine the vein measures from six to twelve feet wide and has been traced for a distance of half a mile on the company's property. Such properties are eminently suitable for companies with large capital.

In the silver district the Rabbit mountain, Twin City and Beaver mines have been worked all winter. The two former have made shipments of smelting ore and have a large amount of stamp rock on their dumps. The Twin City is ready to make another shipment of the same class of ore. Throughout this district the silver occurs in the black slates of Cambrian age.

Numerous discoveries of different kinds of minerals have been made on the north shore east of Port Arthur. Notably a zinc-blende deposit northeast of Neepegon bay, which will probably be worked extensively during the coming summer.

This whole mining country would be served with railway facilities by the construction of the Thunder Bay Colonization railway to connect with the Grand Maine and Vermillion Lake railway, and the Duluth and Iron Range railway, now in operation from the iron mines to the Lake Shore, and to be completed this year to Duluth, to connect there with the American system of railways.

The outlook of the mining industry in the district of Thunder Bay was never better than at present, and it should be encouraged in every legitimate way. Stock-gambling has now no foothold in the country, but practical men are becoming interested in the development of the mine. Let the work continue as it has begun and the value of this promising mining field will soon be established beyond any doubt.

### CORRESPONDENCE.

PORT ARTHUR, Thunder Bay.

To the Editor CANADIAN MINING REVIEW,  
Ottawa.

SIR,

I wish to correct a few statements which appeared about me in No. 1, Vol. 3, February, 1885, of your paper—for which, however, I suppose you are not responsible.

It is true that I examined and reported on the Beaver mine (in this district), but was not aware until to-day that this report had become public.

In the first place, the five samples of ore referred to by me were distinctly stated in my report not to represent the average of the vein, but to be average specimens of the different kinds of silver ore occurring in it. I presume that I could have secured specimens showing no silver, as I certainly could have secured specimens far richer than the richest that I assayed.

Next, the outcrop specimens assayed six dollars and sixty cents, which is slightly different from the \$660 that you have it.

Also, though \$995.75 certainly is the average of the results of these five assays, as I find on computation, still this fact was not mentioned by me—it is certainly misleading and has no value at all. Altogether, it seems to me to be an impossibility to obtain an average of a vein in five specimens.

Re the Rabbit Mountain mine, my report states that silver ore was showing in the drift and cross cut. I did not state that any of it was being extracted.

Yours, etc.,  
W. H. FURLONGE.

March 23rd, 1885.

We regret that Mr. Furlonge should have been misrepresented in our notes on the Lake Superior mines, published in the last issue of REVIEW. These reports came to us, precisely as published, from an occasional correspondent of Port Arthur, and although we had misgivings as to the accuracy of the figures they contained, time did not admit of our waiting for their verification. We are indebted to Mr. Furlonge for his promptness in correcting these errors.—Ed.

**British Columbia Notes.**

Mr. Baillie-Grohman has contributed an interested paper to the *Canadian Gazette*, descriptive of the resources of Kootenay

A petition addressed to the Lieutenant-Governor has been circulated in Barkerville for signatures praying that the geological surveyor employed in the province by the Dominion Government be requested to survey the district of Cariboo. There is a great deal of money and much energy expended annually in prospecting, and as very little is known regarding the extent of the gold-bearing belt, both money and energy are liable to be wasted in the absence of a geological survey.

The output of the several Nanaimo and Wellington Collieries for the year 1884 amounted to 395,900 tons, 87,388 tons of which was used in this province, and 308,512 was exported to the Pacific Coast States and Sandwich Islands and China. In 1883 the total output amounted to 216,184, and in 1882, the largest output of any year before 1884, it amounted to 282,000. In 1883 the home consumption was 64,786 tons, and in 1882, 56,161 tons as compared with 87,388 tons in 1884. The total output of 1884 is 179,184 in excess of 1883 and 113,900 tons in excess of 1882. To mine this 365,900 tons of coal it is estimated that 300,000 pounds of blasting powder was used. The material increase during 1884 was caused by the Vancouver Coal company energetically working their new mines on the Esplanade and at South Field. It is to be hoped that the year 1885 will show a material increase over 1884.

A meeting of miners was held in Victoria early in February with Mr. P. Smith chairman and Mr. R. Smith secretary. The following resolutions were adopted unanimously by the meeting: 1. That, owing to the insolvent conduct and threats of the Indians on Lorne creek last season, this meeting is of the opinion that the Government should take immediate action with regard to the protection of the life and property of miners situated in the aforesaid locality. 2. That this meeting deprecates the action of the Dominion Government in commuting the sentence of death passed on the murderer of Voemans, as it will be the means

of inciting and encouraging the Indians to commit more murders and depredations. 3. That the protection of miners and their interests is urgently demanded, and if neglected by those who are in authority over them they alone must be responsible for the consequences of inaction and apparent partiality.

The mineral exhibits for the International and Colonial Exhibition at Antwerp, forwarded from the Province of British Columbia, are as follows:

Three blocks coal from Vancouver Coal Company mine Nanaimo—4 cwt., 2 cwt., and 1 cwt.—to form a pyramid.

A block of Jarvis Inlet granite, Newcastle sandstone, and Beaver Cove Marble, to form another pyramid.

Specimen of Queen Charlotte anthracite. Blocks of iron ore magnetic and red hematite from Sooke.

Piece of Eureka mine silver ore from Hope. Another piece from the Sterling mine, Cowichan. Specimens of Jarvis Inlet copper.

Specimens of argentiferous galena from Kootenay.

Five specimens of Cariboo quartz from Burns Mountain, supplied by Messrs. Oppenheimer Bros., of this city, and valued at \$250.

**Petroleum in the North-West Territories.**

The discovery of Petroleum in the Athabasca and Alberta districts is attracting a good deal of attention at the present time, and it is not unlikely that boring will be begun in the early spring. A strong company of capitalists of Minneapolis has been organized under the laws of the State of Minnesota, with a capital stock of \$1,500,000, to operate on the Lesser Slave and Red Deer rivers, where they have taken up extensive tracts of petroleum lands. This company, known as the Winnipeg and North-west Petroleum Company, have staid faith in the value of the locations they have selected, and have given substantial evidence of it by shipping two car loads of machinery, at a cost of over \$50,000, to Winnipeg to be forwarded to Sinclair on the line of the Canadian Pacific railway, and thence to their property on the Red Deer river, Alberta district.

It is stated that on this company's locations exist, probably, the most promising indications ever known where oil wells are not in actual operation. The crude petroleum exudes from the bank for a distance of half a mile and flows down the river, while similar indications are noticeable on the banks of the smaller streams, tributaries to the Lesser Slave and Red Deer, running through the companies locations. Petroleum gum and pools of oil on the surface of the ground occur in such quantity and of such a nature as to satisfy experts that extensive reservoirs of oil will be tapped by boring, and that flowing wells will unquestionably be struck. These locations have long been known by the North-west explorers as the "gum beds." The company is sanguine that oil will be obtained in paying quantities not far below the surface and at comparatively small expense.

Analyses of the gum taken from these petroleum fields have been made by Professor Chapman, of Toronto; Professor James A. Dodge, of the University of Minnesota; and by Ledoux and Ricketts, of New York.

PROFESSOR CHAPMAN.

Inflammable and volatile matter.....	94.53
Fixed carbon and ash.....	5.47
	100.00

PROFESSOR DODGE.

Volatile combustible matter.....	76.27
Coke.....	16.43
Ash.....	7.31
	100.00

LEDOUX AND RICKETTS.

Water.....	1.00
Oil.....	65.00
Coke.....	20.00
Light oil and Volatile matter.....	14.00
	100.00

Professor Dodge gives the analysis of the oil as follows:—

	Per cent.
Water.....	54.8
Inflammable oil.....	26.2
Inflammable gases.....	2.2
Non-volatile combustible matter.....	2.9
Incombustible matter, or ash.....	13.9
	100.00

The developing of these oil fields will be watched with much interest, and if the expectations of the Winnipeg and North-west Petroleum Company are but partially realized this will become a most important industry in the North-west Territories. People having the enterprise to inaugurate an industry of such importance to the country should receive every encouragement at the hands of the Government, and it would not be more than should be reasonably expected if the machinery necessary to operate these oil fields were admitted into the country free of duty, or at least such of it as is not obtainable in Canada. In the case of the ranchers in the North-west they have been, and still are, permitted to bring their cattle in from the United States to stock their ranches, and if they are to be thus encouraged why should not the miners be dealt with as liberally, especially those who would develop such important deposits as those of coal and petroleum?

**The Victoria (Australia) Gold Product.**

As reported by a correspondent of the London *Mining Journal* of the 28th February, while the gold product of 1883 was 139,108 ounces less than 1882 that of 1884 was 33,957 ounces greater than 1883. According to the aforesaid correspondent, the product for the five years below was as follows:

	Ounces.	Our valuation.
1880.....	812,692	15,560,000
1881.....	836,416	16,810,000
1882.....	879,381	16,710,000
1883.....	740,378	14,047,000
1884.....	774,330	14,712,000

Total product 1880-84.....\$77,839,000  
Yearly average.....\$15,567,800

That is, the product of 1883 was below the average of the period \$1,500,800 but that of 1884 was below the average but \$855,800. For the two years of 1883 and 1884 the gold exports and coinage of the colony were as understated:

	1883, ounces.	1884, ounces.
Mined.....	399,186	562,708
Exported.....	393,413	189,866
Exported coin.....	\$11,236,000	\$6,246,000

It may be safely estimated that the product of all the other gold fields of Australia did not exceed \$9,778,000 in 1884, and that the total gold product of all the Australian colonies did not exceed \$21,500,000.—*N. Y. Mining Record.*

The most disastrous colliery explosion of recent times occurred during the present month at the Camphanen pit, near Saarbrück, in Rhenish Prussia. Out of 218 men in the pit only seventeen escaped—the remaining 201 are supposed to have perished.

**GOLD MINING IN CALIFORNIA.**

We are indebted to Mr. W. Van Norden, President of the Plymouth Consolidated Gold Mining Company, for a copy of the annual report of the company's operations from the time of its organization up to the close of 1884. The report is convincing evidence of what can be done with a good property under careful and proper management. This company was organized June 1st, 1883, by the consolidation of the *Empire*, the *Amador Pacific* and the *Plymouth companies*, since which time the production of bullion, up to January 1st, 1885, amounted to \$1,714,008.65. The report shows that during the period mentioned (19 months) the operating expenses were \$541,158.75, and that \$148,554.85 had been distributed on construction account. Up to the close of 1884 dividends had been paid aggregating \$950,000, leaving cash on hand on January 1st, 1885, \$74,295.06. Since the report was published the company has paid \$150,000 in dividends, making a total of \$1,100,000 paid in dividends in somewhat less than two years.

The property of the company is located in the town of Plymouth, Amador county, California. The principal mine consists of an immense chimney of ribbon quartz from thirty to fifty feet wide and 315 to 450 feet long. The ore mills freely and contains one to two per cent. of sulphurets; the average yield of gold being thirteen dollars to the ton. There are two mills on the property, located about 1,000 feet apart, having an aggregate of 120 stamps, one with eighty and the other forty, the latter being the heavier, weighing 900 lbs. each. Both mills are crushing about 250 tons of rock daily; they were run with regularity during the past year and crushed in the aggregate about 80,000 tons of ore. Connected with the mills are forty Frue concentrators for saving sulphurets. The company has recently constructed chlorination works, and every department is conducted with economy and exactness, which accounts, in a great measure, for the marked success attending the operations at this mine.

**A New and Remarkable Gold Deposit.**

Through the courtesy of Mr. John Musson, of Sydney, New South Wales, we have received the report of Mr. R. L. Jack, of the Queensland Geological Survey, on the Mount Morgan gold deposit.

Mount Morgan is only twenty-two miles from Rockhampton, on the Fitzroy river, and not more than half that distance from the Central railroad. It is an isolated cone, rising from the plain through which runs the river Dee, the plain being flanked east and west by bluffs of Mesozoic sandstone, out of which the valley has evidently been carved down to the level of the primitive stratified rocks that now form its floor. These old shales and quartzites are riven by dikes of rhodite; and through them have evidently come to the surface geyser springs, the deposit from which has formed the cone of Mount Morgan. The water has, besides gold, carried in solution silica, iron, alumina, etc. But the gold seems to have been precipitated chiefly in the cup of the geyser, and to be rich in a large mass of iron ore, which, in the form of an inverted cone, forms the vertical axis of the mountain, and in the nodules of iron ore that occur in certain soft cellular siliceous layers. These alternate with more or less ferruginous layers, all of which radiate, like the leaves of a fan, from the base of the cone, and include the iron ore. Gold occurs in all the layers, except

in a siliceous earth, and therefore its association with iron is certainly not accidental.

Mining is conducted by quarrying down the apex of the cone, and from an open cut 100 feet below the summit. The yield of the rock is almost fabulous. Working returns are not given; but fair samples selected by Mr. Jack gave from a quarter of an ounce to 10 ounces per ton, and others sent to the Sydney mint to be experimented on gave 85 ounces per ton. Some of the rock in these samples was selected.

Prolonged amalgamation extracts only about half the gold; but during the few months the mine was worked, prior to the publication of the memoir, the Sydney mint had received 10,000 ounces. It differed from any other gold known to commerce in that it was unalloyed with silver, assaying 99.7 per cent. of pure gold, the 0.3 per cent. being copper and iron.

A few more such mines would relieve the financial world of the apprehension it seems to be labouring under of a scarcity of gold.

It is worthy of note that the report was mailed in Sydney on January 28th, and received here on February 28th.

As might be expected, the wildest estimates of the value of this gold deposit or hill are circulating. One that we have seen gives it at about \$135,000,000.—*Engineering and Mining Journal*, N. Y.

**GOLD NOTES.**

The gold product of the Province of Nova Scotia from 1862 to the close of 1884 has aggregated 366,995 ounces.

The value of the gold production of the Province of British Columbia from 1853 up to the close of 1884 amounts to \$48,626,963.

Since the discovery of gold in California in 1848 up to the present time the production of that State and of Australia has been as follows: California, 1848-1884, 37 years..... \$1,200,000,000 Australia, 1851-1884, 34 years..... 1,350,000,000

In February, 1851, gold was discovered on the Macquarie River, New South Wales. This led to the working of the vast gold fields of Australia. The maximum was reached in 1852 when the Australian placers yielded \$102,000,000.

In sinking an artesian well at Savannah, clay was struck at a depth of 110 feet that yielded a large percentage of gold. Fine specimens of crystal quartz are brought up daily. A large lump of ore was found about the size of a hen's egg and containing fully 75 per cent. of silver.

Estimated stock of gold coin in the world at the time of the discovery of America in the year 1492.....	\$ 140,000,000
Gold production of the world, 1493 to 1600.....	\$20,000,000
" " " " 1601 to 1700.....	628,000,000
" " " " 1701 to 1800.....	1,308,800,000
" " " " 1801 to 1850.....	\$16,200,000
" " " " 1851 to 1883.....	4,158,350,000
Total since discovery of America.....	\$7,571,950,000
Estimated stock of gold in the world at the present time.....	\$2,750,000,000

The El Callao Mine, of Venezuela, during 1884, shipped gold bullion to Barring Iron & Co., London, to the value of \$3,475,000, out of which the share-owners received in dividends \$36 per share of their holdings, aggregating \$1,800,000. In January, 1885, this famous mine produced 8,532½ ounces of gold and paid

a dividend of \$3.33½ per share, aggregating \$107,333. In January, 1884, 12,941 ounces of gold were shipped from this mine valued at \$233,000.

On the 19th of January, 1848, James W. Marshall, while engaged in digging a race for Sutter's sawmill, at Coloma, on the American fork of the Sacramento River, found some pieces of yellow metal which he supposed to be gold. This was the first installment of over twelve hundred millions of dollars which the placers and quartz mines of California have yielded to the world. The production reached its maximum in 1853, when \$65,000,000 was produced from placer mining.

**Miscellaneous Notes.**

Utah's mineral product in 1884 was \$7,389,836.

The State of Nevada produced \$7,000,000 of gold and silver in 1884.

The Russian platinum mines are said to be the most valuable mines in the world.

The Comstock mines, of Nevada, produced \$180,000,000 of silver and \$145,000,000 of gold in 20 years.

It is estimated that the gold product of Queensland during the past ten years has reached \$75,000,000.

The estimated amount of anthracite coal remaining in the fields of Pennsylvania is 23,300,000,000 tons.

For the fiscal year ending June 30, 1884, the export of precious metals from Mexico amounted to \$33,473,283 in value.

The official return of the exportation of rough and uncut diamonds exported from the Kimberly division of the Cape of Good Hope during November, 1884, states that their weight in carats was 212,098½, and their declared value £246,875.

**ASSESSMENT DIRECTORY.**

(N. Y. Mining Record.)

This table is prepared from the official advertisements published by the organ of the San Francisco Stock Exchange.

[Stocks are sold in New York with assessments paid fifteen days anterior to the date of delinquency at office of the Company, as given in the table below.]

COMPANY.	When levied.	Delinquency Board.	De linq. in office.	Day of Sale.	Am't.
Excelsior W. & M.	7 Sept	2	Mar	11 Mar	50
Bulwer Co.	1 Jan	13 Feb	13 Feb	21 Mar	20
Independence	14 Jan	21 Feb	21 Mar	21 Mar	15
California W.M.	15 Jan	22 Feb	22 Mar	21 Mar	15
Champion	18 Jan	25	Mar	21 Mar	10
Bate Creek Hyd.	18 Jan	25	Mar	21 Mar	10
Savage	22 Feb	2	Mar	21 Mar	50
Bodie Tunnel	20 Feb	10	Mar	21 Mar	20
Jewell's Steam Co.	2 Feb	4	Mar	21 Mar	20
Homeward Bound	2 Feb	4	Mar	21 Mar	15
Goldconda	11 Feb	1	Mar	21 Mar	60
Belmont	22 Feb	11	Mar	21 Mar	15
Union Com.	22 Feb	11	Mar	21 Mar	15
Opbir	22 Feb	11	Mar	21 Mar	15
Sierra Nevada	22 Feb	11	Mar	21 Mar	15
Cal. Paper Co.	22 Feb	11	Mar	21 Mar	15
Golden Channel	22 Feb	11	Mar	21 Mar	15
Mexican	22 Feb	11	Mar	21 Mar	15
Andes	22 Feb	11	Mar	21 Mar	15
Hale & Norcross	22 Feb	11	Mar	21 Mar	15
North Star	22 Feb	11	Mar	21 Mar	15
The Tower Co.	22 Feb	11	Mar	21 Mar	15
Alaska	22 Feb	11	Mar	21 Mar	15
Sulphur	22 Feb	11	Mar	21 Mar	15

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