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REPORT ON MINING OPERATIONS IN THE PROVINCE OF QUEBEC DURING THE YEAR 1924

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Énergie et Ressources
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Québec 

PROVINCE OF QUEBEC, CANADA

Department of Colonization, Mines and Fisheries

BUREAU OF MINES

Honourable J. E. PERRAULT, Minister

L. A. RICHARD, Deputy-Minister

THÉO. C. DENIS, Superintendent of Mines

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MINING OPERATIONS
IN THE
PROVINCE OF QUEBEC
DURING THE YEAR 1924



QUEBEC
PRINTED BY Ls. A. PROULX
PRINTER TO HIS MAJESTY THE KING

1925

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N O T E

In the statistical tables and in the review of the mining industry of the Province during the year, the term "production" is synonymous with "quantity sold or shipped", and does not necessarily represent "output". The ore and other mineral products remaining as "stock on hand" at the end of the year are not included in the production figures.

The ton used throughout is that of 2,000 lb., except when specially mentioned.

The year referred to is the calendar year, ending December 31st unless otherwise stated.

We endeavour to give values of the mineral products, raw or prepared, as estimated at the point of shipment or at the pit-mouth; this, however, is sometimes difficult to obtain.

The present report was preceded, on February 21st, by a statistical statement on the mineral production in 1924, giving provisional figures, subject to revision. The present report gives the revised statistics, and the tables in this volume supersede those of the preliminary statement.

Bureau of Mines,
Quebec, May 1st, 1925.

MINING OPERATIONS

IN THE

PROVINCE OF QUEBEC

DURING THE YEAR 1924

STATISTICAL REVIEW

The products of the mines and quarries of the province of Quebec, in 1924, attained a total value of \$18,952,896. As compared with the previous year, 1923, when the value reached \$21,236,314, it is a decrease of \$2,373,418, or 11.3%.

The production may be roughly subdivided as follows:—(a) Building materials, \$11,380,977; (b) other non-metallic minerals, \$7,191,115; metallic minerals, \$380,804.

The production of metallic ores is still very small, but it is gratifying to note that in 1924 it represents slightly more than $1\frac{3}{4}\%$ of the total, as compared with $\frac{1}{2}$ of 1% in 1923. Every item of our metallic products shows an increase, as compared with 1923.

This resumption is due to the better prices of the metals which ruled during the year. The New York metal quotations for the first week of the year 1925 were as follows: Copper 14.80c. per lb; lead 10c.; zinc 7.85c., whereas for the corresponding period in 1924 they were 12.50; 7.85; and 6.37, respectively.

Lead and zinc ore mining was much more active than in 1923. The production of copper-sulphur ores, which had practically ceased for three years, was resumed. Molybdenite also appears on the list, after having dropped out since 1919. The small production of gold and silver, still comes in the shape of by-products from the treatment of the copper, lead and zinc ores. There has not yet

been any production from the Northwestern Quebec gold belt. In this region, however, from the Ontario boundary to the Bell river, intense prospecting and developing activity prevailed, practically the whole year. In that distance of 100 miles, claims have been staked in every township, proving a continuous zone of mineralization, having an east and west direction, and a width of two to eight miles. These activities are set forth further on in this report, by Mr. A. O. Dufresne, the assistant-superintendent of Mines, who visited the region in August and September of 1924.

It is interesting to note that intensive hydro-electric power development is now going on in the province of Quebec. The Duke-Price Power Co. are developing the Grande Décharge Falls, the outlet of Lake St. John by the Saguenay river. It is expected that by August 1924, there will be available for distribution, 320,000 H.P. in eight units of 40,000 H.P. each. Moreover, foundations are laid and provision made to add four units more as soon as needed.

The St. Maurice Power Company are completing the development of the Gabelle Falls, 120,000 H.P. on the St. Maurice river below Shawinigan Falls.

The Quinze Power Co. Ltd. have completed the development of the Quinze rapids, north of Lake Temiscamingue, 20,000 H.P.

It is expected that construction of the development on the Paugan Falls 120,000 H.P., on the Gatineau river by the Hull Electric Power Co., and of the Batiscan Falls, 20,000 H.P., by the North Shore Power Co. will be started this spring.

These will bring to three-quarters of a million H.P. the new power which will be available within the next few months, some of which will be available at very low rates for blocks of 10,000, probably the lowest rates in North-America.

There is little doubt that electro-metallurgy will play a most important rôle in the development of Quebec's metalliferous deposits and these two important natural resources, minerals and water-powers, will help each other and contribute to our national prosperity.

Asbestos is our principal non-metallic product, followed by mica, feldspar and magnesite. During 1924 the asbestos market

conditions were unsatisfactory, due mainly to a keen price-cutting competition in selling fibre to manufacturers, which resulted in a fall of prices. Feldspar mining was comparatively active, and its production is yearly assuming greater importance. Mica shows a serious falling off, after a good year in 1923. This decrease is due to some extent to over production in 1923, and also to the competition of Madagascar mica in European markets and even in the United States market.

Building materials were in marked decrease in 1924. This, to a great extent is due to a reduction in building activities of large edifices and industrial construction, and to the fact that road construction was less, the crushed stone used in such operations being included in the building materials. An analytic report, by Mr. Henri Gauthier, on building materials in 1924, is given further on. Mr. Gauthier, formerly of the Federal Department of Mines, is now inspector on the staff of the Quebec Bureau of Mines, and has more specially charge of the inspection and the technology of quarries, clay and sand industries.

The following table gives the figures of the yearly value of our mineral production for every third year since 1898, the first year when full mineral statistics were collected by provincial authorities. It enables to follow the progress of the Quebec mining industry in the past quarter of a century:—

YEAR	VALUE	YEAR	VALUE
1898.....	\$ 1,673,337	1915.....	\$ 11,765,873
1900.....	2,556,754	1918.....	18,707,762
1903.....	2,772,762	1920.....	*28,392,939
1906.....	5,019,932	1921.....	15,522,988
1909.....	5,552,062	1924.....	18,952,896
1912.....	11,187,110		

* Maximum production attained.

**TABLE OF THE MINERAL PRODUCTION OF THE
PROVINCE OF QUEBEC 1924**

SUBSTANCES	No. of workmen	Wages	Quantities	Value in 1924	Value in 1923
		\$		\$	\$
Asbestos, tons.....	2,399	2,823,633	225,224	6,571,594	7,364,259
Chromite, tons.....					52,650
Copper and Sulphur ore, tons.....	87	130,061	9,286	156,287	.....
Dolomite, tons.....	6	4,584	1,609	9,049	8,770
Feldspar, tons.....	145	101,563	16,222	143,076	97,591
Gold, oz.....	367	477,022	891	18,372	13,340
Graphite, lb.....	44	22,310	90,429	3,264	2,219
Kaolin and Fire clay, tons.....	21	11,735	.....	.....	2,369
Magnesite, tons.....	93	57,557	7,950	101,122	126,781
Mica, lb.....	196	78,110	3,252,583	162,951	236,211
Mineral paints (iron oxide, ochre) tons.....	42	30,396	7,129	88,540	116,402
Mineral water, gal.....	3	317	7,683	2,288	2,450
Molybdenite, lb.....	25	12,935	13,239	6,606	920
Phosphate, tons.....					.....
Quartz & silica rock, tons.....	59	45,515	18,063	88,958	67,710
Silver, oz.....			73,251	48,833	19,916
Talc, soapstone, tons.....	21	13,810	449	20,273	20,230
Titaniferous iron ore, tons.....	12	656	1,408	3,771	180
Zinc and Lead ore.....	195	105,302	4,763	146,935	24,334
<i>Building Materials</i>					
Brick, M.....	946	679,064	115,251	1,859,330	2,018,349
Cement, bbls.....	593	852,525	2,754,979	4,796,959	6,347,986
Granite.....	356	269,228	.....	381,922	659,411
Lime, tons.....	252	180,727	86,274	684,581	574,741
Limestone, tons.....	1,609	1,152,932	1,638,660	2,276,248	1,976,665
Marble, tons.....	123	138,799	11,363	331,100	197,555
Sand, building, tons.....	382	258,123	2,359,235	498,866	453,382
Sandstone, tons.....	204	57,647	99,473	115,275	90,760
Slate, tons.....					17,289
Tile, drain and sewer pipe, pottery, etc.....	90	76,930	.....	436,696	833,844
Totals.....	8,270	7,581,481	.....	18,952,896	21,326,314

AMENDMENTS TO THE MINING LAW

Some important amendments to the mining law, were brought in during the session of the legislature which prorogued on April 2nd 1925. The outstanding measure was the amendment of *Article 2105* changing the principle of mine taxation. Previously this was in the form of a royalty on the gross output, or production, of the mine, the rate being established by Order-in-Council, and it could vary with the various minerals. By the amendment passed this session and sanctioned on April 2nd 1925, the principle was adopted of levying duties or taxes, on the net income, or profits, instead of on the gross value of the products. In this respect the principles adopted by the Province of Ontario, as set forth in the Ontario Mining Tax Act, have been very closely followed, and the rates are now established by Statute instead of by the Lieutenant-Governor in Council.

Article 2121 was also amended, increasing from \$500 to one thousand dollars per 100 acres the compulsory expenditure on mining concession, before the patents may be issued.

Article 2102 was amended and now reads as follows:—

“1. Every owner, lessee, holder, occupier, manager or operator of any mine or quarry, from which any ore, minerals or mineral-bearing substances whatsoever are taken, shall, within the ten days next after the beginning of operations or the resuming thereof after a suspension of six months, under penalty of a fine not to exceed twenty-five dollars and costs, and of imprisonment not to exceed one month in default of payment, send a notice in writing to the Minister, setting forth:

(a) The name of the mine as well as the name and address of the owner, lessee, holder, manager, occupier and operator of such mine;

(b) The name and address of the manager or any other person upon whom the notices to be served under this section may be served;

(c) The situation and the description of the land where the operations are being effected;

(d) The nature of the ore, minerals or mineral-bearing substances forming the object of operations.

Notice shall also be given to the Minister, without delay, of any change in the name or address of the manager or other person to whom the notices must be sent, as well as of any change of owner, lessee, holder, manager, occupier or operator of such mine or quarry, of any suspension of mining operations or of any resuming thereof after suspension.

2. From the information so given, and from any other available source, the Minister shall prepare and keep a list showing all operating mines in the Province of Quebec, with the names and addresses and other particulars as contained in the notices (keeping in a distinct and separate column the names and addresses for the service of the notices), and any notice to be served under this article shall be deemed to have been properly served if mailed by registered letter to the person, whose name and address for service have been given, at such address, or, in case such a name and address be not so furnished, then if mailed by registered letter to the address deemed most likely to reach the proper person."

Another measure was passed entitled, "An Act to encourage the exploitation of iron ore," as follows:—

HIS MAJESTY, with the advice and consent of the Legislative Council and of the Legislative Assembly of Quebec, enacts as follows:

1. In this act, which may be cited under the name of "Iron Ore Premium Act, 1925":

- a. The term "unit" means one per cent;
- b. The word "ton" means 2,240 pounds, avoirdupois weight.

2. The Lieutenant-Governor in Council may, for a period of ten years from the coming into force of this act, pay annually, out of the consolidated revenue fund, to exploiters or producers of iron ore, derived from deposits exploited in the Province of Quebec, a premium at the rate of four-fifths of a cent per unit of iron metal contained in every ton of iron ore, as follows:

a. On iron ore of low content, after its concentration or beneficiation in mills or plants situated in the Province of Quebec and delivered to blast-furnaces, or other establishments manufacturing pig-iron, iron or steel, also situated in the Province of Quebec, to be utilized in said establishments;

b. On crude ore, when delivered to blast-furnaces or other plants for manufacturing pig-iron, iron and steel, situated in the Province of Quebec, and to be utilized in said establishments.]

3. The determining of the iron metal content of iron ore covered by the premium shall be effected on samples of ore dried at a temperature of 212 degrees Fahrenheit.

4. The Minister of Colonization, Mines and Fisheries shall have charge of the carrying out of this act, and is authorized to take such means as he deems advisable to control and verify claims the premium.

5. This act shall come into force on the day of its sanction.

Therefore since April 3rd, 1925, all iron ores mined and smelted in the Province of Quebec, are entitled to a bonus equal to 40c. per gross ton of a standard contents of 50% metallic iron.

MINING RECORDING OFFICES

The mining recording office which was opened in Ville-Marie in May 1923 has functioned very satisfactorily in charge of Mr. P. H. Soulard.

Following the prospecting activity which developed in the eastern part of the gold bearing belt, in the region of the head-waters of the Haricana river and in the townships of Cadillac and Fournière, a second mining recording office was opened at Amos in May 1924, as presaged in our report for 1923. It is now in charge of Mr. Paul Vincent.

The jurisdiction of the Amos recording office extends over Abitibi county and comprises therefore the townships of Dufresnoy, Clérey, La Pause, Bousquet, Montanier, which in 1923 were under the Ville-Marie office.

RAILWAYS

During the last session charters were granted to the following companies for the purpose of building railway lines, all of which propose to serve mineralized regions.

The "*Rouyn Mines Railway Company*" obtained a charter to build from O'Brien, on the Canadian National Rys' transcontinental line, to a point in Rouyn township, thence to fork west to the Ontario boundary and east and south-east to the Grand Lake Victoria. This line would therefore serve the whole of the new mineral district, and as the ruling grades and curves on the transcontinental line are probably the most favourable in Canada, the Rouyn Mines Railway would give the best possible connection and easiest haulage from Rouyn to Montreal and Quebec city.

The "*Abitibi Southern Railway Company*" obtained a charter to construct a railway from Amos, on the Canadian National transcontinental line, to Mont-Laurier and Maniwaki, a distance of some 250 miles. This line would pass through the region of the headwaters of the Harricana river, where numerous gold finds have been made.

The *Quebec Great-Northern Railway Co.*, obtained a charter to build rail connection from Quebec city to Chicoutimi, thence to a point on Hamilton Inlet, and branches from their main line to James Bay to the west, and Seven Islands to the South. The mineral resources of the large territory which this railway would serve have not been investigated in detail, but are known to include large iron ore deposits at the headwaters of Hamilton river.

The *Thurso and Nation Valley Railway Company* intend to build a line 35 miles long, from Thurso northward. This would serve a region where are known to occur deposits of feldspar, mica, magnesite and graphite.

Besides the above charters which have been granted by the Quebec Legislature it may be mentioned that the *Nipissing Central Ry.*, which built the line in Ontario from Swastika, on the Temiscaming and Northern Ontario Ry., to Larder Lake, has a federal charter. This company intends to produce their line from Larder Lake to Rouyn township.

Therefore the new fields seem assured of railway communication in a very near future.

MINING VENTURES AND THE PUBLIC

We have repeatedly drawn the attention of the interested public to the fact that while the new gold district in Northwestern Quebec is very promising as to its mineral resources, it has none of the earmarks of developing into a "poor man's camp". It will take large investments and outlay, highly specialized technical skill and considerable risks of losses before any returns can be expected. The new field is therefore not for hard-earned savings or for small investors who cannot afford to take risks of losing their investments. One of the comforting features of the development of the Rouyn-Harricana field, is that very few appeals for funds have been made by selling shares of mining companies to the public at large. The preliminary work is being done by strong syndicates who have the advantage of long experience and of the highest technical advice.

"Much risk attends the investigations of the most promising discoveries made by the prospector. It is at this point that considerable capital is usually required; diamond-drilling, sinking shafts, driving levels, crosscutting and extensive and careful sampling are necessary to determine the extent and character of the presumptive ore-body. Many factors, in addition to the size and richness of the deposit, enter into the problem of economic possibilities. Many of those on which mining operations are continued never pay dividends and many others pay dividends only after several years of careful and persistent effort has been expended on them.

"Many mining companies and investment corporations are glad to take a venture on a property that looks worth while, and a great deal of money is being spent in Canada by such companies at the present time in the search for mineral deposits of value. These companies have a clear understanding of the chances they are taking, and employ the best of skilled and technical advice so as to reduce the risks to a minimum. They go about their work with very little blowing of trumpets; they do not fill the daily press with full page advertisements, or flood post-offices with luried prospectuses. It is against much of the "get-rich-quick" propaganda, in which risks are not mentioned, that the uninitiated public is to be warned. First-class properties do not require this method of financing.

"Mining is, however, a legitimate speculation. It is a speculation in which there is great risk; it is the counterbalancing possibility of great gains that makes it attractive. The development of the industry is dependent on men and companies who understand the business, and are prepared to take long changes. *In the prospecting and development stages no man should place more money than he can afford to lose.*" *

CHEMICAL LABORATORIES

The Quebec Bureau of Mines maintains at the Polytechnique School, of the University of Montreal, 1430 St. Denis Street, an up-to-date, well equipped laboratory for the convenience of the interested public. Analyses, assays, determinations of minerals, and tests of various ores, samples and materials found within the boundaries of the Province of Quebec, are made in this laboratory at prices which are extremely low for the high grade work done. This laboratory has been established for the sole purpose of aiding the development of the mineral resources of the Province of Quebec. Prospectors and all persons interested in the Quebec mineral resources are cordially invited to avail themselves of the facilities offered. The tariff in force for the analysis and assays of various substances is given further on, and it will be realized that the fees are very low, as the high competence of the chemists ensure results of undoubted reliability.

For the convenience of the prospectors in the new gold-fields of Temiscamingue and Abitibi counties arrangements have been made by the Department to open assay offices in the region. As a result the firm J. T. Donald & Co. analytical and consulting chemists of Montreal has opened, at Rouyn, a well equipped assay laboratory under the name of "Quebec Testing Laboratories" and Mr. Maurice Archambault, a graduate analytical chemist of Polytechnical School of the University of Montreal has opened a similar laboratory at Amos, on the Transcontinental Railway.

During the year ending December 31st 1924, the Provincial Laboratory at Montreal, has effected 1,939 analyses, assays and tests, as follows:

* From Summary report Department of Mines, Ottawa, for 1924, page 31.

Alumina, 6; arsenic, 6; ash, 14; bismuth, 1; calorific power, 8; chrome, 1; combustion, 6; copper, 68; fixed carbon, 14; gold, 789; graphite, 12; iron, 23; lead, 34; lime, 17; magnesia, 13; manganese, 5; moisture, 11; molybdenum, 1; nickel, 6; phosphorus, 2; platinum, 1; potash, 5; silica, 17; silver, 787; soda, 3; sulphur, 10; tellurium, 6; titanium, 1; volatile matter, 15; zinc, 11; qualitative tests, 46.

Besides these it may be added that, as in the past years, a large number of minerals and rocks was determined at the office of the Bureau of Mines, at the Parliament Buildings, Quebec. Of these, 165 samples were sent by mail and 125 letters were written in answer, giving the enquirer the determination of the sample submitted, and its commercial value, if any. An approximately equal number of samples and specimens were brought personally to the office by the interested finders, and verbal information given, making in all about 325 determinations. For the work done at the head office in Quebec no fees are charged, and moreover, technical advice and information as to the value, industrial uses and commercial possibilities of mineral samples and substances is gladly given free of charge to prospectors, finders and all persons interested in Quebec mineral resources.

Province of Quebec

GOVERNMENT ASSAY LABORATORY

(Under the direction of the Department of Mines of the Province of Quebec as an aid to the development of the mineral resources).

TARIFF OF FEES FOR ASSAYS AND ANALYSES

DETERMINATIONS	Less than 5 samples Each:	For 5 samples or more Each:
	\$ Cts.	\$ Cts.
Moisture.....	0.25	0.25
Combined water.....	0.50	0.50
Gold and Silver.....	1.00	0.90
Silica, Copper, Iron.....	{ 1 constituent 2 constituents	1.00
	{ in same sample	1.75
Iron, in titaniferous ore.....	2.00	1.80
Graphite, Alumina, Lime, Magnesia, Sulphur, Lead, Nickel, Cobalt.....	{ 1 constituent 2 constituents	1.50
	{ in same sample	2.50
Antimony, Zinc, Manganese, Chromium, Tita- nium, Arsenic, Phosphorus, Platinum, Bismuth.	{ 1 constituent 2 constituents	2.00
	{ in same sample	3.50
Commercial analysis of an iron ore, comprising determination of silica, iron, phosphorus, titanium and sulphur.....	6.50	5.85
Commercial analysis of a limestone or cement, comprising: silica, lime, iron, alumina, magnesia, and sulphuric acid.....	6.00	5.40
Commercial analysis (proximate analysis) of a fuel, comprising: ash, volatile combustible, fixed carbon, moisture.....	3.00	2.70
Calorie power of a fuel.....	1.50	1.35
Radioactivity of a mineral.....	1.00	0.90
Radioactivity of a mineral water.....	2.00	1.80

DETERMINATION OF MINERALS.—For a nominal fee of 25c. for each sample, the laboratory will make determinations of ores and minerals, provided rapid tests will allow it, and issue a report on probable contents and commercial value of specimens and samples.

TERMS.—Money in payment of fees by registered letter, postal notes or orders, must invariably accompany the samples in order to insure prompt return of certificate.

Remittances by money order or accepted cheque, payable at par in Montreal, should be made out to the order of PROVINCIAL ASSAY LABORATORY, not to any individual.

Professor AD. MAILHIOT
In charge of Laboratory

No. 1430, St. Denis, St., Montreal.



Asbestos Corporation of Canada, Ltd.—New King mill, Theford Mines.

MINING OPERATIONS IN 1924

ASBESTOS

The shipments and sales of asbestos in 1924 totaled 208,762 tons, valued at \$6,561,659, as compared with 216,804 tons, valued at \$7,364,260 in 1923. In tonnage it is a falling off of 3.8%, whereas in value the proportional decrease is nearly 11%. This decrease in value is due to competition among the mine operators, whereby prices were cut down from the previous years' prevailing rates, as may be seen from the detailed tables of production of asbestos given further on.

The average price per ton of asbestos shipped in 1924 was \$31.37, as compared with \$33.97 in 1923. The contents of asbestos in the rock mined, and the quality and length of the fibre produced are well maintained, and do not show the slightest sign of decrease. The tonnage of asbestos rock mined and hoisted in 1924 was 3,324,727 tons and it yielded an average of 124 lb. of fibre of all grades per ton of rock, representing a value of \$1.83¹. In 1923 these figures were 117 lb. valued at \$2.12. (1)

(1) These values are only approximate. The value for 1923 was given last year as \$1.42. The new value of \$2.12 was arrived at by a more accurate method of calculation.

PRODUCTION OF ASBESTOS IN THE PROVINCE OF QUEBEC FOR 1924

DESIGNATION OF GRADE	SHIPMENTS AND SALES			STOCKS ON HAND DEC. 31ST 1924	
	TONS	VALUE	AVERAGE VALUE PER TON	TONS	VALUE *
Crude No. 1.....	871	\$ 318,761	\$ 365.97	1,387	\$ 507,600
Crude No. 2.....	3,550	721,165	215.27	1,801	387,701
Crude run of mine.....	222	84,730	156.44	547	85,573
Spinning Fibre.....	9,799	1,085,918	110.81	7,634	845,924
Shingle Fibre.....	21,569	973,356	45.12	6,432	290,212
Paper Stocks and others.....	172,751	3,427,729	19.84	23,565	467,530
Totals.....	208,762	\$ 6,561,659	31.37	41,366	2,584,540
By-products (sand and gravel).....	16,464	9,934	0.60		
Totals.....	225,226	\$ 6,571,593		41,366	\$ 2,584,540

Quantity of asbestos rock mined during the year 1924:—3,324,727 tons.

PRODUCTION OF ASBESTOS IN THE PROVINCE OF QUEBEC FOR 1923

DESIGNATION OF GRADE	SHIPMENTS AND SALES			STOCKS ON HAND DEC. 31ST 1923	
	TONS	VALUE	AVERAGE VALUE PER TON	TONS	VALUE *
Crude No. 1.....	400	\$ 189,215	\$ 472.60	1,462	\$ 671,698
Crude No. 2.....	2,743	650,845	237.29	2,532	605,091
Crude run of mine.....	636	112,468	176.86	567	123,581
Spinning Fibre.....	11,417	1,408,518	123.37	9,772	1,207,525
Shingle Fibre.....	16,153	921,546	57.05	11,606	670,941
Paper stocks and others.....	185,455	4,081,668	22.01	18,425	315,396
Total.....	216,804	7,364,260	33.97	44,364	3,594,332
By-products (sand and gravel).....	16,171	17,794	1.18		
Totals.....	232,975	\$ 7,382,054		44,364	\$ 3,594,332

Quantity of rock mined during the year:—3,747,576 tons.

* Values calculated at average price of each grade. These figures are given merely as an approximate guide of valuation of stocks on hand.

The table given below presents the average yearly prices of the various grades of asbestos since 1920.

TABLE OF AVERAGE PRICES OF ASBESTOS AND TOTAL PRODUCTION FOR THE YEARS 1910 TO 1924

YEAR	AVERAGE VALUE PER TON OF ASBESTOS					Tons of Asbestos produced	Total value
	Crude No. 1	Crude No. 2	Fibre No. 1	Fibre No. 2	Fibre No. 3		
						Tons	
1910	\$ 259.57	\$ 121.82	\$ 60.88	\$ 25.48	\$ 10.46	70,605	\$ 2,667,829
1911	277.30	113.68	65.54	20.33	13.57	102,224	3,026,306
1912	263.16	100.76	64.42	31.17	13.21	111,175	3,059,084
1913	275.00	134.00	59.00	27.75	13.75	136,609	3,830,504
1914	301.96	131.85	60.40	24.93	11.18	107,401	2,895,935
1915	274.36	122.44	64.32	26.84	12.57	113,115	3,544,362
1916	422.76	219.77	77.57	28.46	14.84	133,339	5,182,905
1917	778.38	381.46	99.90	36.77	17.75	137,242	7,198,558
1918	937.92	424.74	163.87	57.17	26.36	142,375	9,019,809
1919	1,256.74	618.77	222.15	53.02	19.40	135,862	10,932,289
1920	1,475.07	811.41	279.63	110.35	35.49	179,891	14,749,048
1921	1,281.32	446.91	263.09	101.75	31.19	87,475	5,189,789
1922	648.68	265.32	207.71	81.00	21.65	160,339	6,053,068
1923	472.60	225.90	123.37	57.05	22.01	216,804	7,364,260
1924	365.97	215.27	110.81	45.12	19.84	208,762	6,561,659

EXPORTS OF UNMANUFACTURED CANADIAN ASBESTOS FOR TWELVE
MONTHS ENDING DECEMBER 31ST, 1924

(From Reports of Trade of Canada, Dominion Bureau of Statistics,
Ottawa)

COUNTRY	TONS	VALUE
United Kingdom.....	9,714.....	\$ 428,663
United States.....	161,815.....	5,027,392
Australia.....	473.....	241,130
Belgium.....	2,858.....	151,235
France.....	5,965.....	458,421
Germany.....	10,541.....	810,758
Italy.....	2,439.....	151,778
Japan.....	9,222.....	358,596
Netherland.....	1,068.....	88,580
Other countries.....	654.....	17,506
	204,749	\$ 7,734,859

Asbestos mining in 1924.—Returns of sales and shipments of asbestos were received from 13 producers during 1924. Of these, 10 operated 13 mines, and three shipped only from stocks on hand, having done no mining work during the year:

Asbestos Corporation of Canada, Ltd., Thetford Mines, P. Q.

Asbestos Mines, Ltd., East Broughton, P. Q.

Bennett-Martin Asbestos and Chrome Mines, Ltd., Thetford Mines, P. Q.

Black Lake Asbestos & Chrome Co. Ltd., Black Lake, P. Q.

Canada Asbestos and Chrome Co., Black Lake, P. Q.

Canadian Johns-Manville Co. Ltd., Asbestos, P. Q.

Consolidated Asbestos, Ltd., Thetford Mines, P. Q.

Federal Asbestos Company, Robertsonville, P. Q.

Johnson's Company, Thetford Mines, P. Q.

Keasbey & Mattison, (Bell Asbestos Mines Department), Thetford Mines, Que.

Maple Leaf Asbestos Corporation, Ltd., Thetford Mines, P. Q.

Pennington Asbestos Company, Thetford Mines, P. Q.

Quebec Asbestos Corporation, East Broughton, P. Q.

Besides the above, returns of shipments were received from the Northern Asbestos Co., Thetford Mines and the Universal Asbestos Co., Robertsonville. These two companies do not operate mines, but were organized to work over some of the tailing or refuse dumps of some of the larger mills, to further extract the short fibre left in the serpentine sands which otherwise would be wasted. They have put up small simple mills, one at Thetford Mines, the other at Robertsonville. The short fibre resulting from these operations find a market at prices ranging from \$7.50 to \$15 a ton.

The *Asbestos Corporation of Canada* operated their three mines, the King mine lot 26, range V of Thetford; the Beaver mine, lot 32, range C of Coleraine; the British-Canadian mines, Block A, of Coleraine. Their fourth mine, the Fraser, lot 14, range VII at East Broughton remained closed all year.

At the King mine, the new mill, which was started in December 1923, gave very satisfactory results throughout the whole year. Removal of the overburden to extend the pit to the north-east was carried on actively from April to December. The new dust collecting plant, which was erected to replace the one burned down in 1923, is on the same principle as the one in operation at the Beaver mine of which a short account was given in our last year's report. Both were designed by Mr. C. O. Smith, chief engineer of the Asbestos Corporation. The principle adopted is to use burlap as filter-cloth, instead of using it as baffles as in the old plant. Moreover the air is finally filtered through close weave burlap before being discharged to the outside.

The *Bennett-Martin Asbestos and Chrome Co. Ltd.*, made a voluntary assignment to creditors on January 9th, 1924. Neither the Thetford Mine nor the Vimy Ridge mine were operated, only a few men being kept in the mills and yards. At the end of the year the liquidators had not yet concluded the winding up of the affairs, but all stocks which had remained in the sheds from the 1923 operations had been disposed of and shipped.

The *Consolidated Asbestos Ltd.* mine was operated during the greater part of the year. The manager, Mr. Norman Fisher, resigned to engage entirely in consulting work. The chief engineer, Mr. G. L. Treglown, was appointed to the vacancy.

The Bell mine of *Keasbey and Mattison Co., Mines Department* worked practically continuously throughout the year. Removal of the overburden at the north-west end of the pit was carried on actively to extend mining operations in that direction. A large dust collecting shed was erected in connection with the mill.

The *Maple Leaf Asbestos Corporation Ltd.*, operated steadily their mine situated on lot 29, range A of Coleraine. The mining method was changed when spring operations were resumed, in March, by the installation of a steam shovel, and the setting up of a mammoth crusher. Briefly, the new equipment consists of a 1½ yd. Marion Steam shovel, full revolving, mounted on steel caterpillars. From the shovel the ore is hauled by a gravity skip (4 cub. yds.) and dumped into a 36" x 48" Buchanan all-steel crusher. From the crusher the ore is carried by a 24 inch belt conveyor, 500 feet long, to a 300 ton bin, which feeds a 15" x 30" jaw crusher, thence through the dryer, and to the mill. During the first three months of the year, many minor improvements were introduced in the mill, which increased its efficiency.

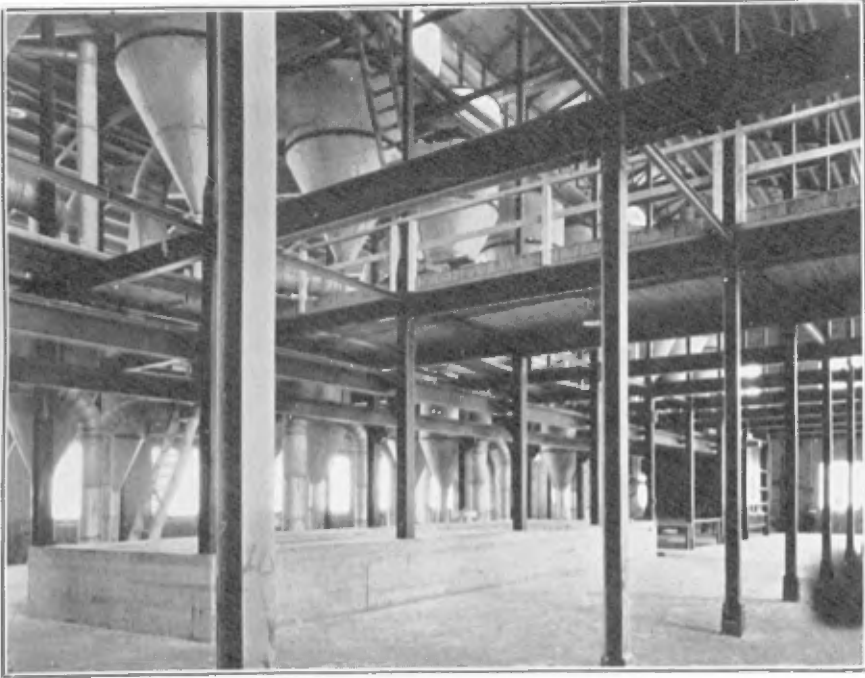
The *Federal Asbestos Co.*, at Robertsonville operated its mine practically continuously throughout the year. The dryer building was rebuilt and another rotary dryer added. Several changes were introduced in the mill, improving the practice. A new powder house and thawing house have been constructed.

Work at the mine of *Asbestos Mines Ltd.*, was resumed on April 1st after closing down for the winter months, and except for a stop of six weeks in the late summer, it was operated continuously. The management is considering the adoption of the new wet process of separation developed by Selective Treatment, and in that case the mill would have to be entirely remodelled.

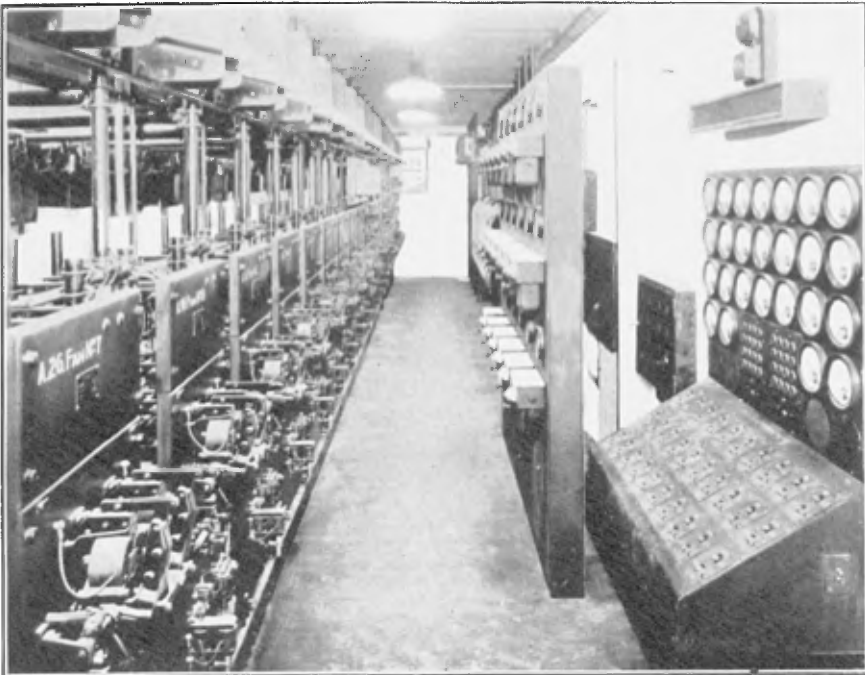
The mine of the *Canada Asbestos and Chrome Co.*, which in 1923 was worked under lease by the "Asbestos Quarries Ltd., was reopened for a couple of months, and made small shipments.

The Jeffrey mine of the *Canadian Johns-Manville Co.*, at Asbestos was operated the whole year without interruption.

An important event in the Canadian Asbestos industry was the opening of the manufacturing plant of the Canadian Johns-Manville at Asbestos, which was put in operation and began manu-



Asbestos Corporation of Canada, Ltd.—King mill.—Collectors of asbestos fibre.



Asbestos Corporation of Canada, Ltd.—King mill.—Electric control installation.

facturing in June 1924. This plant had been in the course of erection for some twelve months, and it is by far the largest of the kind in Canada. The building is 1,000 feet long, 200 feet wide, with foundations and floor of concrete; reinforced concrete columns support steel roof trusses; spacious windows fill most of the space between the columns. The building is fire-proof, modern, and up-to-date in all its details.

Asbestos paper and mill board are manufactured on a large scale; asbestos roofing of all kinds; asbestos rigid shingles; asbestos building materials; asbestos cellular, and sponge felted pipe insulations; insulating sheets and blocks; asbestos brake linings and clutch facings are woven on special looms, necessary for making asbestos textiles; asbestos packings for steam, oil and hydraulic operations.

Johnson's Company operated their Thetford property actively but their Black Lake mine remained closed all year.

The *Quebec Asbestos Corporation*, operated their two mines. No. 1 and No. 2 at East Broughton, which are the old Ling Mine and the Eastern Townships mine respectively. In mine No. 2 a new steam shovel has been set up. A great deal of work was done on the surface in the latter part of the year removing large quantities of overburden to extend the mining operations.

The mine of the *Pennington Asbestos* company at Robertsonville remained closed all year. On January 5th 1925, the company made a voluntary assignment and the liquidation is in the hands of Messrs. Larue, Trudel & Picher, liquidators and chartered accountants of Quebec.

Selective Treatment Ltd., is a company organized some three years ago to develop a new asbestos milling process, to separate the asbestos fibre from the rock by water. This company erected an experimental and demonstration plant in 1923, and they report for 1924 having practically terminated the research work and perfected the process, so that its practical application is now assured. Plans are being completed for the construction of a plant to treat 720 tons of asbestos-bearing rock a day and it is expected that construction will start shortly. It is claimed that the last experiments and tests definitely showed that the new wet process pos-

sesses great advantages over the present dry process, such as, much higher recovery of fibre, less breakage of fibre, no dust pollution of the air, and a great economy of fuel in drying, as only the fibre is dried, instead of the whole volume of the rock.

ASBESTOS IN OTHER COUNTRIES

Ontario, Canada.—The following paragraph taken from the "Preliminary Report of the Mineral Production of Ontario in 1924", published by the Ontario Bureau of Mines, is very interesting and gives a glimpse of the asbestos possibilities of our sister province.

"Small veins of asbestos have been discovered in the past years in many parts of Ontario. In 1916 and 1917 shipments to the value of \$100 and \$2,150, respectively, were made by the Slade-Forbes Asbestos Company, from a location in Deloro township, south of the gold-producing area of Porcupine. In 1923 the Bowman Asbestos Company shipped six tons, valued at \$2,600, from a claim near McKay Lake, in the same township, while in 1924 the production by this company increased to 172 tons, valued at \$91,900. The shipments contained several grades: crude asbestos fibre, No. 1 crude, No. 2 crude, and run-of-mine ore. The Bowman asbestos property is the first of its kind in Ontario upon which organized development has been rewarded with satisfactory results. At the time of writing, there has been completed a transmission line for electric power, an automobile road from Timmins, and complete camp buildings have been erected. A mill building is ready for machinery to be transported from Timmins where it is in readiness. It is expected that three mining shifts will be running by the middle of March. The name of the company has been changed to Porcupine Asbestos Mining Syndicate of Timmins."

Rhodesia.—The shipments of asbestos from South Rhodesia in 1924 amounted to 26,141 gross tons of a declared value of £603,423. This is the largest tonnage ever shipped in one year, the previous record having been in 1923, when it was 20,364 long tons. In 1924 the average price per long ton was therefore £23.1 sh, whereas in 1923 it had been £30.16 sh., a very marked decrease in price.

It is interesting to note that the imports of asbestos into the United States from South Africa ports, which include imports from

both South Rhodesia and the Union of South Africa, amounted to 2,294 tons valued at \$364,726. (1)

Rhodesia is now easily the second largest producer of asbestos, coming immediately after Canada. Of the Rhodesian asbestos operators the "Rhodesian and General Asbestos Corporation" is the largest, organized with an authorized capital of £360,000. This company owns five operating mines, namely the Shabanie, the Birthday and the Orphans' Luck in the Belingwe field (Bulawayo), and the King and the Gash's mines in the Mashaba (Victoria) field. In 1924 these mines now controlled by the Rhodesian and General Asbestos Corporation produced 80% of the South Rhodesian output.

Union of South Africa.—The latest official figures of production of asbestos available are for the calendar year 1923, which are 8,393 short tons, valued at £121,453. (2) As compared with the previous year, 4,389 tons valued £81,230, it is a substantial increase. The 1923 production is subdivided as follows by province: Transvaal, 4,076 tons valued at £66,320 and Cape, 4,317 tons valued at £55,063.

Transvaal produces chrysotile, crocidolite and amosite, but according to the official report the amosite and blue asbestos production in Transvaal was practically stagnant. The main production was chrysotile from the Kantoorberg mine operated by the New Amianthus Mine. Cape province produces blue asbestos altogether.

Russia.—That the Russian asbestos industry is recovering is shown by the figures of production for the past four years, given in the "Mineral Resources of the United States for 1923" as having been as follows: 1920, 1,478 tons; 1921, 2,604 tons; 1922, 3,215 tons; 1923, 7,153 tons. These figures were taken from "Gornyi Zhurnal". In the pre-war years the annual production varied between 10,000 and 18,000 tons.

(1) Compiled from "Asbestos", Philadelphia, Pa.

(2) Report of Dept. of Mines and Industrie for 1923 of Union of South Africa, Pretoria, 1924.

The "Russian Review" states that during the fiscal year ended October 1st, 1924, the quantity of Asbestos produced in the Urals amounted to 8,100 tons. (*)

COPPER AND SULPHUR ORES

It is gratifying to note, for the year 1924, a resumption of activity in the copper and sulphur ore mining of the Eastern Townships. The shipments amounted to 5,254 tons of copper ore, and 4,032 tons of pyrite of an average content of 50% sulphur, used for the manufacture of sulphuric acid, or in all 9,286 tons valued at \$156,287.

The *Eustis Mining Company*, who had closed the Eustis mine in 1919, started working it again in the spring of 1924 and were responsible for the whole production of the year. During the previous year, 1923, a great deal of experimenting was done on the concentration of the ore, and on its separation into a straight copper ore on one hand, and a sulphur ore for the manufacture of sulphuric acid on the other. This object was achieved, the mill has been altered and improved accordingly and mining was resumed early in 1924.

The ore is now separated into copper concentrate, containing between 20 and 22% metallic copper, and a pyrite concentrate of 50% sulphur. It is claimed that practically 95% of the copper contents of the ore, is recovered in the copper concentrate.

The following description of the new mill and process is copied from the Report on "Investigations in Ore Dressing and Metallurgy in 1923." **

"NEW CONCENTRATOR FOR THE EUSTIS MINING CO., EUSTIS, QUE.

"Alterations to the concentrator of the Eustis Mining Company were completed and the concentrator put into operation in the early part of October, 1923.

(*) Engineering and Mining Journal, April 25th, 1925.

(**) Published by Mines Branch, Department of Mines, Ottawa, 1925.

"The Eustis mine is in the Eastern Townships of Quebec, about 7 miles south of Sherbrooke. The first discovery of copper was made in 1865, and since then about a million tons of ore have been mined. The present shaft is now at a depth of over 4,000 feet.

The milling ore is a heavy sulphide, containing chalcopyrite associated with pyrite and small quantities of calcite, quartz, and other gangue minerals. It is free from arsenic and is an excellent ore for acid-making. The ore is now mined principally for the copper content. A typical analysis is, copper 3 per cent, iron 40 per cent, sulphur 45 per cent, insoluble 7.5 per cent, other gangue 4.6 per cent.

Concentration by selective flotation.—Research carried on for a period of over a year, by the company in co-operation with the Department of Mines, was successful in working out a flotation process by which the copper-bearing mineral could be separated from the iron sulphides (pyrites) and gangue. The old concentrator, which had been able to do little more than eliminate the gangue minerals, was completely remodelled, and the new process installed.

A brief description of the new process is as follows. The ore is taken by electric haulage and gravity incline from the mine to the mill, where ample storage is provided. The mill has a capacity of 200 tons per day. Standard practice is used in the coarse crushing or breaking department of the mill, where the ore is reduced to one and one-half inches. A 300-ton circular ore-bin provides storage capacity for the ball mill feed. The ore is fed by a belt conveyor to an 8-foot cylindrical ball mill, the discharge of this mill is divided between two 6-foot ball mills that operate in closed circuit with two duplex standard Dorr classifiers. The classifier overflows, which will pass a 100 mesh screen, are maintained at a high density (30 per cent solids) and elevated by Wilfey sand pumps to a Callow, flat bottom, flotation cell, which is 36 feet long by 24 inches wide and 18 inches deep. In this cell, the copper mineral is floated and the iron and gangue minerals dropped. A rougher concentrate, containing the copper, and an iron tailing, which goes to a separate section of the mill for the recovery of the iron sulphides (pyrites) is made. The rougher copper concentrate is recleaned in a second cell, from which a final copper concentrate and a middling product,

which is returned to the first cell for re-treatment, are obtained. The final copper concentrate contains over 20 per cent copper and the recovery made is over 90 per cent.

Reagents for copper flotation.—The separation between the copper (chalcopyrite) and the iron sulphides is controlled by the use of an alkaline pulp. Lime at the rate of 5 to 10 pounds per ton is fed to the ball mills with the ore. The flotation oils used at present are neutral coal tar creosote and a mixture of 25 per cent thio-carbanilide and 75 per cent ortho-toluodine. A little, steam-distilled, pine oil is also used.

Pyrite recovery plant.—The pyrite in the ore is recovered for sale to the Nichols Chemical Co., at Capelton, one mile distant. The tailing from the copper flotation plant is dewatered in a large Dorr thickener to eliminate the bulk of the lime. The thickened pulp is mixed with fresh water and reduced to a pulp containing 25 per cent solids. This diluted pulp is acidified and distributed to two half-size Callow flotation cells, where the pyrite is recovered by flotation. The pyrite concentrate contains 50 to 55 per cent sulphur.

Reagents used for pyrite flotation.—The diluted pulp from the Dorr thickener is acidified by the addition of sulphuric acid. The quantity used is about 10 pounds per ton, original feed. The flotation oils used are fuel oil and crude pine oil."

The Eastern Mining and Milling Co. Ltd., who had secured the old Huntingdon mine and reopened it, discontinued work in March 1924, abandoned the lease and option, and the property has reverted back to the owners the Estate of Pierre Tétrault, Power Building, Montreal.

It was mentioned in our last year's report that the *Noranda Mines Ltd.*, had developed in the Township of Rouyn, the largest deposit of copper ore yet discovered in the Province of Quebec. The further work done on this deposit, which is of a complex ore of copper and gold, consisting of solid sulphides, (pyrite, chalcopyrite and pyrrhotite) has greatly increased the amount of ore practically blocked out. The workings and activities of this company are described at length under the heading of Gold and Silver.

COPPER PROSPECTS IN GASPÉ PENINSULA, QUEBEC *

(By F. J. Alcock)

Introduction.—The present report describes two areas of Gaspé in which deposits of copper have been found. The first is situated near Matane on the north shore of Gaspé; the second is on the headwaters of York river which flows into Gaspé basin.

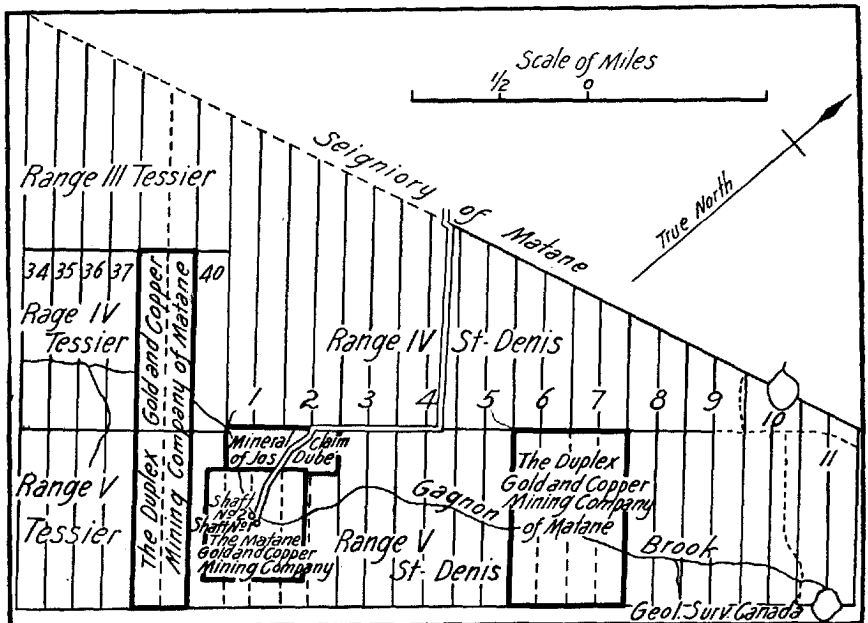
Native Copper near Matane.—The occurrence of native copper in volcanic rock near Matane has been known for thirty years. In the report of the Commissioner of Crown Lands of the province of Quebec for the year 1892 is the following statement: "In the county of Matane attention has been drawn to numerous boulders of trap rock, sometimes reaching a weight of over a ton, and in which are found numerous particles of native copper, in some cases pieces of 1 pound to 1 ½ pounds being found. These rocks are met with over a large area in the River Matane district, but up to the present it has not been possible to locate their origin. It seems reasonable however, to suppose that they were detached from the mountains to the rear which form spurs of the Shickshock range and we may expect that judicious inspection will result in the discovery of some important deposit." In the corresponding report for the following year is another note that copper was found in place on Gagnon brook on lots 2 and 3, range V, St. Denis township, Matane county.

Mining operations on Gagnon brook were subsequently carried out by three companies which in turn operated the same property. The first was known as the Matane Gold and Copper Mining Company; the second, the Duplex Gold and Copper Mining Company of Matane; and, later, a third, known as the Matane Mining and Smelting Company, was formed from the amalgamation of these two companies. Since 1916, Mr. Joseph Dubé has held a mining permit on 100 acres adjoining the property of the Matane Mining and Smelting Company, and on this property a small amount of exploration work has been carried out in recent years.

(*) Summary Report 1923, Part C II, Geological Survey of Canada, Ottawa.

ACCESS

Matane is the eastern terminus of the Canada and Gulf Terminal railway which follows the north shore of Gaspé making connexion with the Canadian National at Mont Joli. A daily service, except on Sunday, is maintained. The mining properties as shown on plan are situated in ranges IV and V, Tessier and St. Denis townships, about 10 miles from Matane. An automobile can be driven to within half a mile of the principal workings, and a good trail can be followed the remaining distance. It is, accordingly, comparatively easy to see the prospects in a single day's trip by car from Matane.



Location of Matane Copper claims, Matane county.

TOPOGRAPHY

The country around Matane consists of rolling land rising gradually back from the St. Lawrence. Terraces are well shown in places, particularly along the rivers. The most prominent is one

along the coast known as the Micmac terrace, at an elevation of about 20 feet above the sea. At a distance of 4 miles from the shore the country reaches an elevation of about 800 feet. The elevation of Gagnon brook at the mineral claims is about 600 feet.

GEOLOGY

The rocks in the neighbourhood of Matane consist of shales, limestone, sandstone, and limestone-conglomerate belonging to the series known as the Quebec group, of Ordovician age. Outcrops are fairly abundant along the shore, in the streams and cliffs, in road cuttings, and in the fields. The general strike is northeast following the outline of the coast, although there is considerable local variation; the dip is usually steep to the southwest. The shales are reddish, greenish-grey, or black. The limestones are grey or in places black, mostly compact, but in places oolitic. Calcareous sandstone and white quartzose sandstone are also found in the series. Beds of limestone-conglomerate form conspicuous outcrops at many places. The area is one where the lack of fossils and the extent of deformation have made it difficult to work out the succession in detail. Associated with the sediments on Gagnon brook is a series of basic lava flows which are in places amygdaloidal. Their age is apparently Ordovician, the same as the sediments with which they are associated.

DUBÉ CLAIM

On the Dubé claim two shafts have been sunk, one to a depth of about 30 feet and the other to about 50 feet, and in addition a number of pits have been opened up in the volcanic rock. The latter is black, dense, and massive. Under the microscope the rock has either a dense basaltic texture or a fine-grained ophitic one. In places the rock is amygdaloidal with amygdules up to 2 inches in length. The smaller ones are commonly spherical, but the larger are very irregularly shaped. The filling is white calcite and red siderite. In places, the siderite occurs as narrow, irregularly-shaped bands in the white calcite. In other places it occurs as small, red spherules in the trap. Greenish amygdules consisting of the chlorite, delessite, also occur.

The volcanic rock is traversed by small veins of quartz, mostly less than an inch in width, in which occur small amounts of black,

resinous anthraxolite. In one vein a little cuprite, the red oxide of copper, was also found. Pyrite is present in some veins, and commonly the quartz and the adjacent rock are stained green with malachite. In some of the veins native copper is thickly disseminated throughout the granular calcite, but the amounts discovered as yet have been very small. It is possible, however, that in the region may be found amounts sufficient to warrant development.

SAUCIER CLAIM

The Saucier claim is the property on which the development was carried out by the three companies already mentioned. It was located during the winter of 1901-1902 by Mr. J. E. Saucier, of Matane. It was visited by Mr. J. Obalski, Inspector of Mines for the province of Quebec, in June, 1902, and in August, 1903. Brief descriptions of the property and the mining development are given in the provincial reports for those years.

The rocks on the property consist of limestone, shale, and a black, basic volcanic, apparently interbedded with the sediments. The strike is north 40 degrees east and the dip is 70 degrees south-east. The limestone is compact and dark grey in colour. The shales are dark grey to black. Bedding is shown by colour banding and by lines of concretions. These concretions are rather striking. They are commonly round and flat and some measure 2 feet in diameter.

In the creek below No. 1 shaft is an interesting rock. It is black and massive and has the appearance of a basic volcanic, except that it is permeated by small, round particles of quartz. In thin section the rock is seen to be made up of quartz grains in a dark green, chloritic matrix. The quartz grains are exceedingly well rounded. Some of them consist of quartz aggregates. Though the majority are well water-worn, the smaller are somewhat angular with a less regular border. The matrix consists of carbonate and dark green chlorite. The rock has the appearance of being a sediment in which the matrix is largely altered, basic, tuffaceous material.

Three shafts were sunk on the property. No. 1 is on the left bank of Gagnon brook. According to Mr. Obalski, this showed a

vein of dark-coloured calcite 4 to 5 feet wide, containing disseminated bornite near the centre and chalcopyrite near the walls. Shaft No. 2 was sunk in the volcanic rock but was abandoned, no other indications having been met with beyond that shown at the surface. No. 3 is situated 250 feet south of No. 1. In 1903 it had been sunk to a depth of 166 feet, and on the 114-foot level drifts and crosscuts had been run. Diamond-drilling operations were also carried out in an endeavour to trace the extent of the mineralized zone. Disseminated bornite and chalcopyrite were found in calcite and limestone over a width of 74 feet. Three specimens from this zone assayed respectively 4.97, 28.6, and 3.85 per cent copper, and No. 2 gave \$1.20 per ton in gold. The amount of ore, however, did not prove sufficient to justify continuation of mining operations.

York River Copper Prospects.—Within recent years prospecting on the headwaters of York river has led to the discovery of sulphides in place, and a number of claims have been staked. A small amount of exploration work has been carried out on a few of the claims. Five days were spent on the claims with Mr. Alfred E. Miller, one of the original stakers.

ACCESS

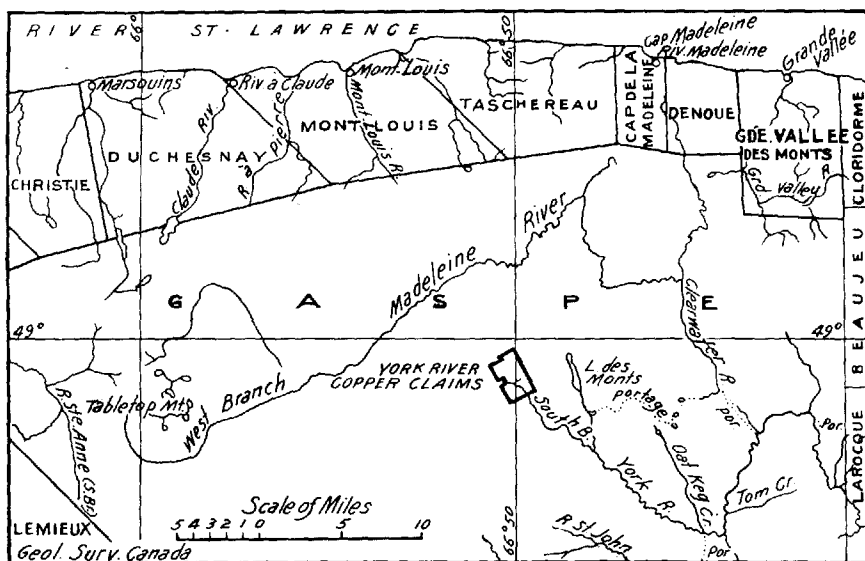
The region is somewhat difficult of access. The shortest way is from Mont-Louis on the north shore of Gaspé. Another route is from Gaspé basin by ascending York river. This is longer, but in spring when canoes can be poled to lac des Monts, it decreases the distance over which supplies and equipment must be portaged. The former route was the one used in reaching the properties in June, but it was found easier to return by descending York river.

Mont-Louis is situated 102 miles by road from Matane. A motorbus runs from Matane to Ste. Anne des Monts and a motorcar can be driven for about another 10 miles, but beyond this the road is only a wagon track. (1) Mont-Louis is, however, a port of call on one of the routes of the Clark Steamship Company. A

(1) Since this report was written this road has been extended eastward from Ste. Anne-des-Monts past Mont-Louis.

weekly service from Montreal along the coast of Gaspé to Charlottetown, Prince Edward Island, is maintained and forms the easiest method of travel to the ports of Gaspé.

From Mont-Louis the route leads up the valley of Mont-Louis river, over the divide to Madeleine river, and across a second divide to the York headwaters. The first 6½ miles can be made with wagon. From this point a fairly good trail can be followed to the Madeleine, about 19 miles from Mont-Louis. The trail crosses the east branch of the Madeleine a short distance from the end of the wagon road and afterwards crosses several smaller tributaries. There is an ascent to 1,400 feet, the summit of the old mature



Sketch map showing location of York River Copper claims, Gaspé. —

surface forming the divide between the Mont-Louis and Madeleine waters; from the height of land there is a descent to the Madeleine which, where crossed by the trail, has an elevation of 840 feet. The crossing is at the site of an old logging camp. The river is here swift and was crossed by means of a raft. From the Madeleine a rough trail leads over the divide to the York waters. There is a

gradual ascent to an elevation of 2,250 feet, to the summit of the plateau surface, and then a descent to the Miller camp on a branch of York river at an elevation of 1,900 feet. The elevations given above are from unchecked barometer readings.

As already mentioned the route followed on returning was by way of York river. From Miller camp, a rough trail leads to Lake of the Mountains or York lake, a distance of about 7 miles. The lake has a length of about 3 miles and, according to Mr. A. E. Miller who sounded it during the past summer, a maximum depth of 70 feet. Two miles below its outlet is a second smaller lake. A good portage trail connects the two, and canoes are usually left at the lower. This point was left at noon of June 23 and the following afternoon the camp known as "the Gulch" was reached. This upper part of the river is swift and winding and has an average fall of about 20 feet a mile. Below the Gulch for a distance of 8 miles, the river is not navigable for canoes on account of several rapids and falls, but below what is known as the "Narrows" it offers a good canoe route to Gaspé basin. From the Gulch a road leads to the main highway ascending the York valley. Through the courtesy of the local fire ranger the packs of the party were carried out by wagon as far as Silver creek where an automobile was met which brought the party to Gaspé basin.

HISTORY

The first survey of York river was made by Robert Bell in 1858, and his geological observations were incorporated in the "Geology of Canada, 1863." In 1910, Professor A. Mailhiot ascended York river and his observations on the geology of the region are included in the 1910 report of the Department of Colonization, Mines, and Fisheries, Quebec.

In the winter of 1923 the same department made detailed surveys of York and St. Johns rivers. The survey of the York was carried up to York lake, up another branch to the Miller mineral claims, and also over to Madeleine river from York lake. The writer is indebted to the department for an advance copy of these surveys.

The first discovery of copper-bearing float on York river was made by A. E. Miller in 1909 while with a timber-cruising party.

A few years later Rupert Miller picked up some pieces near the outlet of York lake about 5 miles farther up. In the summer of 1921 a prospecting party consisting of Messrs. A. E. Miller, F. Miller, and Angus Miller went in to search for the place from which these pieces of float had come. Ore was eventually found in place on what is now called Copper mountain and two claims were staked. The other claims were staked during the following winter and summer. In August, 1922, Mr. T. C. Denis, Superintendent of Mines for the province of Quebec, visited the claims and wrote a report on his findings.

TOPOGRAPHY

The region around the headwaters of York river is a dissected plateau. The higher hills on the mining claims reach elevations over 2,800 feet. Porphyry mountain is a narrow ridge bare of trees on the summit and from it a good view can be had in all directions. To the west, one looks across a broad depression occupied by the Madeleine to the broad, flattopped granite mass of Tabletop which rises to 4,450 feet. To the east, a view down the valley of York river is obtained. Everywhere an even sky-line meets the eye. The highest elevation on the mineral claims is Needle mountain, but on account of its wooded character it does not offer as commanding a view as does Porphyry mountain. The upland country forming the divides between the stream valleys is rolling, commonly openly wooded country, and locally contains small lakes and swamps. The valleys are steep-sided. The actual slope is dependent on the character and attitude of the bedrock. Hard volcanic rocks commonly give steep slopes, folded limestones mostly gentler slopes. The sides of Copper and Porphyry mountains in places consist of talus of loose rock lying at the angle of repose. It is a region which was baselevelled and subsequently, probably in late Tertiary time, uplifted. The present valleys have been produced since this period of uplift.

GEOLOGY

The rocks of the region consist of Palæozoic sediments, volcanics, and intrusives. Outcrops were found on the summits of Copper, Porphyry, and Needle mountains and along some of the valley sides, but over most of the area the bedrock is concealed.

The most abundant rock is limestone, much of which has been altered by acid intrusives. Along the northwest corner of the Sydney Miller claim, well-bedded outcrops of dark blue limestone occur which strike north 15 degrees east and dip 15 degrees to the southeast. In places, the limestone is considerably altered. Massive garnet rock is locally produced near the acid intrusives, in other places there is a considerable development of wollastonite; in still other sections much of the carbonate has been altered to diopside. No fossils were found in the sediments, so their age is not known with certainty. They occur, however, in the belt of rocks which have been mapped as Devonian and since they show certain similarities to known Lower Devonian in other parts of the peninsula it is probable that they are to be correlated with them.

Associated with the altered limestones are fragmental volcanic rocks. The best example observed was found near the summit of Porphyry mountain. It consists of angular fragments of volcanic material, some of which is dense and dark coloured and some of which is lighter and porphyritic.

Intrusive into these rocks are acid porphyritic rocks. These are well exposed on the summit of Porphyry mountain, on Copper mountain, and in the northwest corner of the area. The rock is grey to pink, and consists of a dense matrix in which occur rounded phenocrysts of quartz up to about an eighth of an inch in diameter, phenocrysts of feldspar, and smaller black crystals of mica. In thin section the phenocrysts are seen to consist of quartz, orthoclase, and albite. The orthoclase consists of large crystals, many of which show Carlsbad twinning. Some of the albite occurs as long crystals and many show both albite and Carlsbad twinning. Shreds of brown biotite are fairly abundant. The matrix consists of fine-grained quartz and feldspar. A little secondary chlorite and carbonate are present.

COPPER DEPOSITS

The main copper showing in the region is on the F. A. Miller claim and most of the work carried out in the area has been done here. The west side of Copper mountain near the summit is covered for considerable areas with a talus of loose, angular blocks of rock. The largest trench has been excavated for a length of about

100 feet through the loose material, in places, down to bedrock. The rocks exposed consist of intrusive quartz porphyry and altered sediments. The quartz porphyry is pinkish in colour. The phenocrysts are quartz and feldspar in a dense matrix. Sulphides occur in seams throughout the rock. The sediments consist of altered carbonate rock. A dense grey variety consists largely of garnet of the grossularite variety. In others, there is a development of wollastonite and in other sections the rock is seen to consist of carbonate, quartz, garnet, and diopside. The lime-silicate minerals have been developed as a result of contact metamorphism produced by the intrusion of the quartz porphyry. Associated with the altered carbonate rocks near the summit of the mountain are some banded, dense, dark-coloured rocks which appear to be altered argillaceous sediments.

The mineralization consists of chalcopyrite and some pyrite in the quartz porphyry and intruded rocks. In places, there are veinlets up to three-quarters of an inch in width consisting of pure chalcopyrite. In addition to being present in seams, the chalcopyrite also occurs disseminated through the rocks. A common occurrence is with quartz in narrow seams. In places, it borders the quartz lying between it and the wallrock. The quartz seams vary up to 4 inches in width. Some of them show comb structure. In places are vugs lined with quartz crystals. A little molybdenite was found with chalcopyrite and pyrite in a seam in quartz porphyry. In another vein some black, limonitic, impure chrysocolla was found with quartz, limonite, and some green chrysocolla. Green malachite stain is common throughout the mineralized zone.

The deposits are contact metamorphic in origin, caused by the intrusion of the quartz porphyry. The porphyry dykes are undoubtedly offshoots of a batholith which underlies the central part of Gaspé peninsula. Fifteen miles to the west of the claims is exposed the granite mass of Tabletop mountain. Another exposure of granite continues from Sterling mountain east of lake Ste. Anne westward as far as Barnshaped mountain, and numerous other smaller intrusions of acid composition occur south of this band, all of which are doubtless offshoots of the same batholith. There is little doubt that if the Shickshocks were dissected to a greater depth a much wider extension of granite would be exposed.

The geological conditions are, therefore, favourable for the formation of ore deposits. A region in which a granite batholith is intrusive into sediments and volcanics offers excellent chances to the prospector, and attention should be paid particularly to the zone surrounding the intrusive.

With reference to the particular claims already staked little can be said at present. Copper ore is undoubtedly present, but developments have not as yet revealed any high-grade ore or any large body of low-grade ore of sufficient size to mine. Future work may reveal more ore. Contact metamorphic deposits, however, as a rule are irregular in character and a great deal of work would be required to demonstrate the value of even a promising-looking deposit before mining operations could be recommended in a region so far from transportation.

A DISCOVERY OF COPPER-BEARING MINERALS IN PETITE NATION SEIGNIORY, PAPINEAU COUNTY, QUEBEC *

(By *M. E. Wilson*)

In October, 1923, Mr. Arthur Lannigan, Mr. S. Faloon, Mr. A. R. Robinson, and Mr. R. H. Lannigan, of Calumet, while prospecting in Petite Nation seigniory, discovered chalcocite and bornite in the valley of Sweezy creek, a tributary of Kinonge (Salmon) river. The samples submitted to the Geological Survey by Mr. Lannigan indicated that the discovery might be important and the writer, therefore, arranged with Mr. Lannigan and Mr. Staniforth, manager of the Fassett Lumber Company, owners of the territory in which the chalcocite and bornite were found, to make an examination of the deposit.

The Grenville escarpment, which marks the southern border of the Laurentian highlands to the north of Ottawa river between Montebello and St. Jérôme, is interrupted at Fassett by a transverse depression about 500 feet deep, the valley of Kinonge river.

* Summary Report 1923—Part C I.—Geological Survey of Canada, Ottawa.

About 4 miles north of Fassett a tributary valley about 200 feet deep extends southeasterly from Kinonge river for several miles. At its west end this depression is occupied by Sweezy creek which flows into Kinonge river, and at its east end by Favre (or Clear) lake which has its outlet by way of Little Salmon river into Ottawa river. The deposit of chalcocite and bornite is situated on the south side of this valley about two miles east of Kinonge river. It lies about 5 miles in a straight line from Fassett and $3\frac{1}{2}$ miles from the nearest point on the North Shore line of the Canadian Pacific railway.

The rocks exposed in the region are all Precambrian and belong for the most part to those types which, because of their highly metamorphosed condition, are grouped together as constituting a basal complex. They consist of crystalline limestone and quartzite of the Grenville series intruded by and included in pyroxenic gneiss belonging to the Buckingham series. The prevailing strike of the limestone, quartzite, and gneisses is northeasterly, and the dip nearly vertical. The deposit occurs on a ridge of the pyroxenic gneiss about 25 feet high, 25 to 40 feet wide, and 200 feet long, that projects eastward as a spur from the south side of the valley. The gneiss is a banded variety which under the microscope is seen to consist chiefly of deep green to yellow-green pyroxene, plagioclase largely transformed to scapolite, and quartz. The few remnants of plagioclase examined had the optical properties of andesine, so that the original gneiss was a quartz diorite. The banding of the gneiss consists of irregular alternating zones from 1-16 to 6 inches wide, composed partly of pegmatite but chiefly of variable proportions of pyroxene, scapolitized feldspar, and quartz. The heterogeneity of the rock is further increased by numerous irregular pegmatite dykes cutting transversally across the banding. The dip of the banding, unlike that of the surrounding district, is 30 degrees or less, and variable, so that on the average the banding lies almost horizontal. The character of the pyroxene gneiss in the outcrop is such as to indicate that it has undergone pegmatitic differentiation on a local scale.

The chalcocite (Cu_2S , copper sulphide) occurs in grains and aggregates of grains up to $\frac{1}{2}$ inch in diameter disseminated through the rock, but most abundantly in the quartzose and pegmatitic

phases. The bornite (Cu_3FeS_3) is found in irregular grains here and there in the chalcocite. The extent of the deposit was not determined. The rock surface at the east end of the ridge has been opened up by blasting throughout an area 25 to 30 feet, and the chalcocite and bornite are more or less disseminated throughout this opening. The average percentage of copper present, however, in the whole mass is, probably, less than 1 per cent, so that the deposit as exposed is scarcely high enough in grade to be workable under present conditions. Notwithstanding this, there are other data that must be considered in discussing the possibilities of the discovery of commercial copper deposits in this locality, of which the following are the most important.

Similar occurrences were stated by Mr. Lannigan to have been observed on the slopes of the valley both to the north and south.

The deposit observed appears to be practically a phase of the igneous rock itself, a condition that might prevail throughout extensive masses of the pyroxenic gneiss.

A deposit of this character averaging $1\frac{1}{2}$ per cent copper would be workable provided many million tons of the material were present.

The locality is situated less than 4 miles from the North Shore line of the Canadian Pacific railway and only 2 miles from the Fassett Lumber Company's branch line along Kinonge river.

In view of the foregoing consideration it is obvious that the conditions are favourable for the discovery of a workable deposit of copper in this locality, and that the district should be carefully prospected.

CHROMITE

No shipments of chromite were reported in 1924, and no mining operations were carried on.

The Colonial Chrome Company Ltd., did a great deal of prospecting work on the Bélanger property, lot 19 S. E. range X, of Coleraine, now owned by the U. S. Ferro Alloys Corporation. This prospecting included 3,200 feet of diamond drilling as well as considerable surface work. The results were satisfactory in as much

that they disclosed a large body of ore, suitable for concentration, in close proximity to the mill, but such ore can only be considered as reserves to be mined under very favourable market conditions. At present the Quebec chrome industry cannot compete with Rhodesia, New Caledonia and India.

Rhodesia in 1924 was responsible for practically 75% of the world's production of chromite. The South Rhodesian production reached the record figures of 172,724 long tons valued at £432,482.

GOLD AND SILVER

The gold production in 1924 amounted to 891 ounces valued at \$3,264 and silver 73,251 ounces representing a value of \$48,833. Both metals show a slight increase as compared with 1923, but the figures are as yet insignificant. So far the gold and silver produced only represent by-products recovered in the course of treatment of our copper ores and our lead and zinc ores.

The active prospecting and development in the counties of Temiscamingue and Abitibi mentioned in our reports for 1922 and 1923 continued unabated and the total area staked out in mining claims in that region, which at the end of 1922 was 35,000 acres, and had increased to 185,000 at the end of 1923, exceeded 300,000 acres by the end of 1924.

Mr. A. O. Dufresne, the Assistant-Superintendent of Mines, who extensively visited the region in the course of the summer of 1924 furnishes the following notes of his observations.

NOTES ON SOME OF THE GOLD DEPOSITS IN TEMIS- CAMINGUE AND ABITIBI COUNTIES *

(A. O. Dufresne)

During the summer season of 1924 the westernmost part of the province of Quebec was the scene of intense prospecting, particularly in the region lying south of the transcontinental line of the Canadian National Railways, in the counties of Temiscamingue and Abitibi.

* Translated from the French.

In past reports of the Quebec Bureau of Mines and of the Geological Survey of Canada, numerous mentions are made of geological conditions observed in this region, favourable to mineralization on a large scale and to the possibility of the presence of deposits of economic value.

As early as 1901, the presence of molybdenite deposits in Preissac township had been noted; in 1906 free gold was found on the shore of Lake Fortune, and in 1911 on lake De Montigny in Dubuisson township. So that the report that a prospector, Edmund E. Horne, had located in the fall of 1922, a rich deposit of gold-copper ore in Rouyn township, sufficed to start a considerable rush into the region. To give an idea of the activity which this rush induced, it may be mentioned that the number of miners' certificates issued by the Quebec Bureau of Mines during the fiscal year 1921 previous to the Horne discovery was 490, and that this had increased to 1900 in 1924.

During the year just past the townships in which most activity was displayed were:—Dasserat, Boischatel, Rouyn, Joannès, Bousquet, Cadillac, Malartic, Fournière, Dubuisson, Bourlamaque, Louvicourt, Montbray, Duprat, Dufresnoy, Clérey, Duparquet, Destor. These townships which constitute a continuous zone, are partly in the county of Temiscamingue and partly in the county of Abitibi. Although the prospecting activities covered a much larger part of the two counties, it may be said that ninety per cent of the 300,000 acres of mining land staked out in Northwestern Quebec, are situated in the above mentioned townships.

A part of these townships is underlaid by rocks which geologists pronounce to be an extension into Quebec of a strongly mineralized belt which in Ontario has given rise to the mining camps of Matachewan, Kirkland Lake and Larder Lake.

The northern part of the county of Temiscamingue and the contiguous townships of Abitibi occupy a part of the clay belt which lies within the basin of James Bay. This clay plain of recent origin consists of stratified beds of clay and silt, with occasional sand deposits, and some unstratified glacial deposits, lying on rocks, which for the most part are of crystalline texture. A few hills of low altitude afford the only relief of an otherwise level plain. The

surface of the underlying bed rock is uneven and occasional rock outcrops show through the clay, and reveal to the prospector the geological conditions which enable him to judge of the mineral possibilities. In some townships these outcrops occupy large areas, whereas in others no sign of solid rock may be encountered in a whole day's travel.

As a rule the region is well timbered; except in burnt areas, there is an ample supply for the needs of mining, both in fuel and building timber. Large areas, however, have been leased as timber limits.

Rivers and lakes are numerous. The streams are remarkable by their slack current, and there are very few rapids. Long distances can be covered by motor launches without encountering any obstacles. As an instance, from the town of Amos up to its source, the Harricana river offers an uninterrupted waterway over a distance of 70 miles. During the summer of 1924 two of the development companies had each a "mine trawling" boat, purchased from the U. S. Navy, plying this river, in which 25 men could find passage.

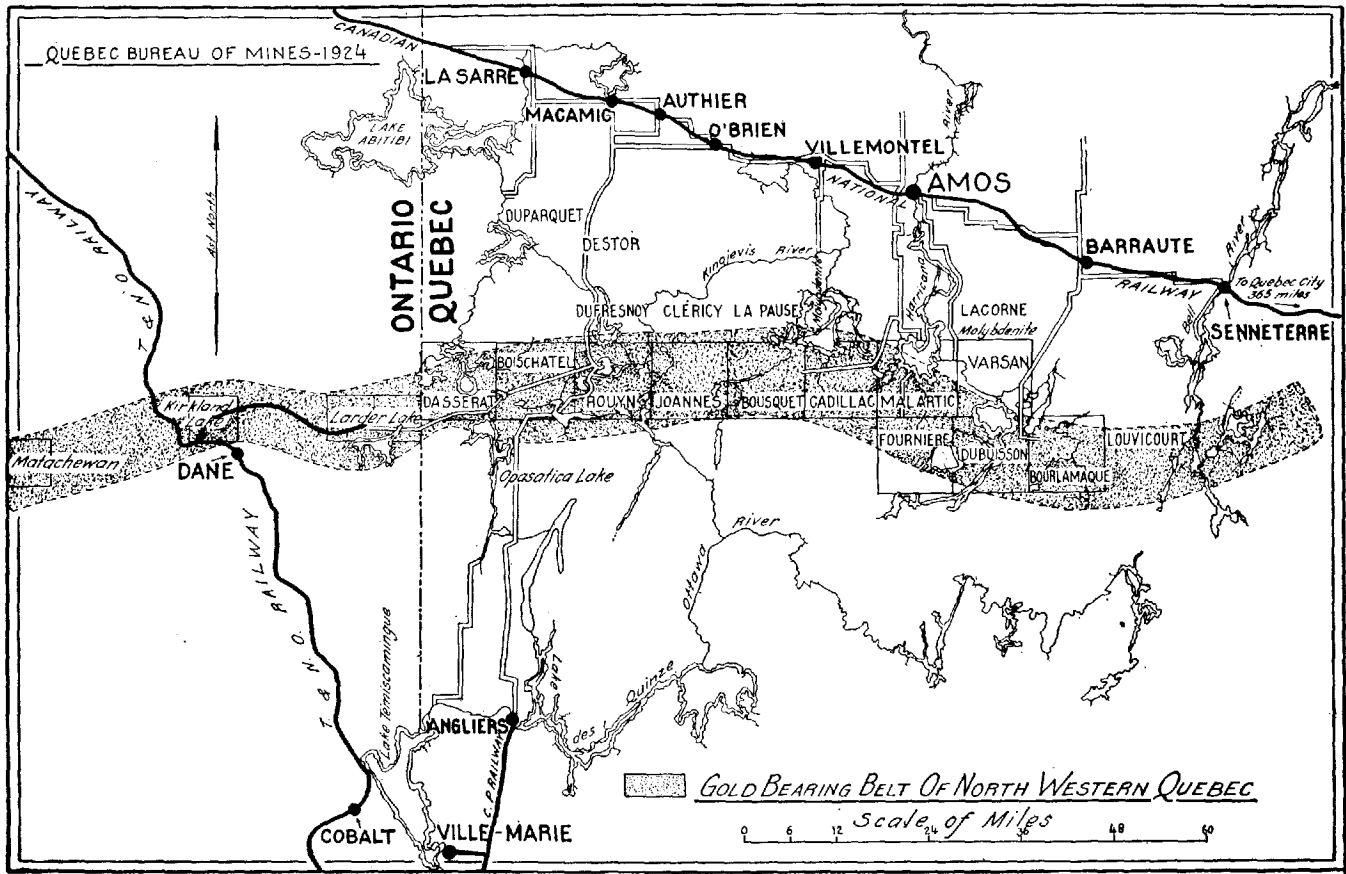
There are, however, in the region a few large streams, on which occur rapids and falls which could be developed for power to supply the needs of local industries. At the Quinze Rapids, near Angliers, 45 miles south of the mineral discoveries in Rouyn, a power company, The Des Quinze Power Co., a subsidiary of The Northern Canada Power Co. Ltd., completed in the fall of 1924 the construction of a first power unit of 20,000 H.P. The dam was constructed in prevision of an ultimate development of 60,000 horse-power.

MEANS OF ACCESS

The mining region is comparatively easy of access. Three railways, on the North, on the South and on the West respectively come within 45 to 50 miles of the mineralized belt. The sketch map on page 46 shows these railroads. On the south, at Angliers on the Quinze river is the terminus of the C. P. R. branch from Mattawa; on the west the Temiscamingue and Northern Ontario reaches Larder Lake by its subsidiary the Nipissing Central Railway; on the north the transcontinental line of the Canadian National Railways practically parallels, at some distance to the north, the mineralized belt.

From the railroads the distance to the mining camps is covered in summer by motor-boats, by canoes, or by air service; in winter by sleds over winter roads. From Angliers, the Ville-Marie Navigation Company maintains during the summer season a regular boat service for passengers and freight. The boats follow Quinze Lake, Ottawa river and Kinojevis river. In winter snow roads connect Angliers and North Temiscamingue to Boischatel and Rouyn. From Larder Lake travelling to Rouyn is practicable only in winter by snow roads. From the North the approach to the mineralized zone offers special advantages. The transcontinental line of the Canadian National Railways runs more or less parallel to the mineralized region. Near the Interprovincial boundary it is distant 40 miles from it, whereas at Senneterre it is only 25 miles distant. This railroad is of the highest order. Its curves are very easy and its grades very low. The country through which it passes in Abitibi county is fertile. It already counts a population of 18,000 whose main pursuits are agriculture and lumbering. From the various stations of Senneterre, Amos, Villemontel and La Sarre canoe routes lead to the various mining camps in summer. Amos the chief town of the county and the most important commercial center of Abitibi is situated on the Harricana river where the railway crosses it. From this town, in a few hours, the townships of Bourlamaque, Dubuisson and Malartic can be reached by motor-boats. In winter, haulage of supplies for the camps is over snow roads cut through the bush by the Provincial government for the use of the prospectors. There are four of these winter roads: the first is from Barraute to Dubuisson and Bourlamaque, the second from Amos to Dubuisson, the third from Amos to Cadillac and the fourth and most important from Macamic to Rouyn. This last road will be widened and improved during the summer of 1925 to convert it into a permanent summer road.

Hydroplane Service.—During the year 1924 for the first time in Canada, aerial transportation for passengers and freight was tried as a commercial enterprise. The *Laurentide Air Service Limited* put on an air service to reach the mining region of Rouyn; with bases at Angliers and at Haileybury this company maintained a regular service from these two places to Rouyn. Its air ships made a few special trips to more distant points when occasion demanded it. This rapid means of transportation greatly facili-



Sketch map of Gold bearing belt and railways.

tated the examination of mining properties. Moreover the air service proved its great usefulness in keeping many of the mining camps supplied with fresh meat. It assured a rapid mail service and brought in other supplies as well as pieces of machinery and other articles.

The distance on the air line from Angliers to Rouyn is 45 miles and it is 60 miles from Haileybury to Rouyn.

The Laurentide Air Service Limited began its regular trips on May 23rd 1924 and they were continued without any interruption until the beginning of winter. Several machines of different types were used. Three of the air ships were of double control model, with a 360 H.P. Liberty engine carrying five passengers with a load of 1,100 pounds; they could fly for 4 ½ hours at the rate of 60 to 70 miles an hour. The Company also had in use another type of machine, a modern hydroplane equipped with a 450 H.P. Napier-Lion motor which was much more powerful than the first ones and carried 1,600 pounds for flights of five hours at 100 miles an hour.

During the season of 1924 the hydroplanes of the Laurentide Air Service Ltd., effected 861 flights representing 1,004 hours in the air; they transported 425 passengers, 8,599 pounds of luggage, 55,385 pounds of supplies, 980 pounds of mail matter. Not a single accident occurred either to passenger or freight. For the transportation of passengers and supplies the company had the following tariff in force:

A single trip from Angliers to Rouyn, \$40.00; return trip, \$75.00; with 25 pounds of baggage allowed per passenger; extra baggage, 20 cents per pound. Parcels of less than 100 pounds, 20 cents a pound with a minimum of \$2.50; 100 to 500 pounds, 17 cents per pound; shipments of 500 to 2,000 pounds, 15 cents per pound; over one ton, 10 cents a pound. *

GEOLOGY:

The counties of Abitibi and Temiscamingue are underlain by Precambrian formations. Igneous rocks of the Keewatin series and Temiscamingue and Cobalt sediments as well as intrusive rocks of various ages constitute the underlying geology of North-

* Canadian Mining Journal, page 174, February 13th, 1925.

western Quebec. The Keewatin series is represented by volcanic rocks and basic plutonic rocks. These are found lying on both sides of the transcontinental line of the Canadian National Railways. They extend to the south to 30 or 40 miles from the railroad. Along the southern edge of the Keewatin, are found outcrops of a belt of sedimentary rocks known as the Temiscamingue series, which rocks extend to the west into Ontario and are cut at Larder Lake and Kirkland Lake by gold-bearing porphyries. In Quebec these conglomerates and sheets are also cut by numerous dykes, and masses of red and grey porphyry. In the townships of Dasserat and Boischatel the rocks of the Temiscamingue series are overlain by conglomerates, quartzites and argillites of the Cobalt series. Having better resisted glacial action these rocks rise above the general level of the country and constitute the Kekeko hills. Throughout the whole region igneous rocks of various textures outcrop in the shape of dykes, masses and batholiths. The main developments are irregular masses of old gabbros, syenite batholiths so prized by prospectors, small dykes of lamprophyres and heavy dykes of quartz and olivine diabase.

The general geology of this region was described in detail in a report by Dr. M. E. Wilson, entitled "Temiscamingue County, Quebec." (1) Moreover, various parts of this region have been geologically mapped and studied in detail and the interested public is referred to the following reports for detailed data. Report on Lake Opasatica region, by Dr. Robert Harvie (2); report by Dr. J. A. Bancroft on the region of Lakes Bousquet and Kewagama, (3) and on the region of Lake De Montigny (4); by Dr. M. E. Wilson on the region of Lake Kewagama (5); Professor A. Mailhiot on the gold deposits of Lake de Montigny (6); by Dr. H. C. Cooke on the Opasatica map-area (7) and on the gold deposits of Western Quebec (8); the report of Dr. W. F. James on the Duparquet map-area (9); and on the Rouyn map-area (10); and by Dr. Robert Harvie on the Dufresnoy map sheet. (11).

- (1) Memoir 103. Geological Survey of Canada, 1918.
- (2) Report on mining operations for 1910, Quebec.
- (3) " " " " " 1911, "
- (4) " " " " " 1912, "
- (5) Memoir No. 39. Geological Survey of Canada, 1913.
- (6) Report on mining operations, 1919, Quebec.
- (7) and (9)—Summary Report 1922, Part D. Geological Survey of Canada.
- (8), (10) and (11)—Summary Report 1923. Part C I. Geological Survey of Canada.



Hydroplane of Laurentide Service, landing on its daily trip to Rouyn.



Mining camp of Noranda Mines, Ltd. on shore of Lake Tremoy, (Osisko).



Post office, Rouyn P. O., Rouyn townsite.



Osisko Hotel, and general store in background, Rouyn townsite, September 1924.



Noranda Mines, Ltd., Shaft No. 1, Miller claim (Horne mine).



Rouyn township, Sheldon claim.—Trenching in heavy overburden of stratified clay.

DESCRIPTION OF SOME OF THE MINERAL DEPOSITS

The object of the present report is to present to the interested public some facts and observations on a few of the mineral deposits recently brought to light in various townships of the counties of Abitibi and Temiscamingue. Unfortunately all the interesting discoveries have not been visited by officers of the Bureau of Mines owing to their great number. The descriptions and observations which follow are the result of personal examinations by one of the officers of the Quebec Bureau of Mines in the course of a six weeks trip in the region, during last summer, supplemented by data taken from the reports of the Geological Survey of Canada mainly those by Dr. C. H. Cooke, Dr. W. F. James and Dr. Robert Harvie.

General Remarks:—Prospecting was mainly carried out in the belt of Temiscamingue sediments and in the Keewatin rocks immediately to the north of it. Prospecting work has brought to light a remarkable number of promising discoveries both in the Temiscamingue and in the Keewatin rocks.

Not less than 92 companies and exploration syndicates have done prospecting, stripping and development work during the year 1924 involving the expenditure of large sums of money. A compilation of the cost of the work done in excess of the compulsory assessment work exacted by our Mining Law shows that the 22 organizations, of which the list is given below, spent on wages alone a sum totalling \$477,022.

List of organizations which performed important development work

Alderson & Mackay.
Arntfield Gold Syndicate.
The Chance Syndicate.
Clark Syndicate.
Dasserat Rouyn Goldfields Ltd.
Don Rouyn Gold Mines Ltd.
Fournière Gold Mines, Ltd.
Huronian Belt Co., Ltd.
Laurentian Gold Mines, Ltd.

McIntyre Porcupine Mines, Ltd.
 Montreal Exploration Co., Ltd.
 Nipissing Mining Co., Ltd.
 Noranda Mines, Ltd.
 M. J. O'Brien, Ltd.
 Ottawa Rouyn Mines, Ltd.
 Rouyn Gold Mines, Ltd.
 Rouyn Gold Pan Syndicate, Ltd.
 Rouyn Quebec Mines, Ltd.
 Siscoe Gold Mines, Ltd.
 Stabell Gold Mines, Ltd.
 Union Mining Corporation.
 Victoria Syndicate.

The observations made so far on the mode of occurrence of the gold deposits are not sufficiently advanced to permit to classify them definitely. Nevertheless from certain obvious characteristics of the ores and country rock, such as the nature of the sulphides, the age and nature of the enclosing rock, the deposits may be grouped under three headings: (a) copper-sulphide ores, constituted by irregular masses of chalcopyrite and pyrrhotite, apparently connected with the dark intrusions cutting the Keewatin, as at the Horne mine; (b) iron sulphide ores, in schisted zones, rich in quartz, carbonates and pyrite, occurring in acid rocks of Keewatin age, as on the Arntfield claims, or in mineralized quartz lenses in granites, as on the Lowry claims in Joannès; and (c) arseno-sulphides, where native gold is found accompanying pyrite and arsenopyrite in blue-grey quartz, in the Temiscamingue sediments, as on the Edna Bathurt's claim in Rouyn.

COPPER-SULPHIDE DEPOSITS

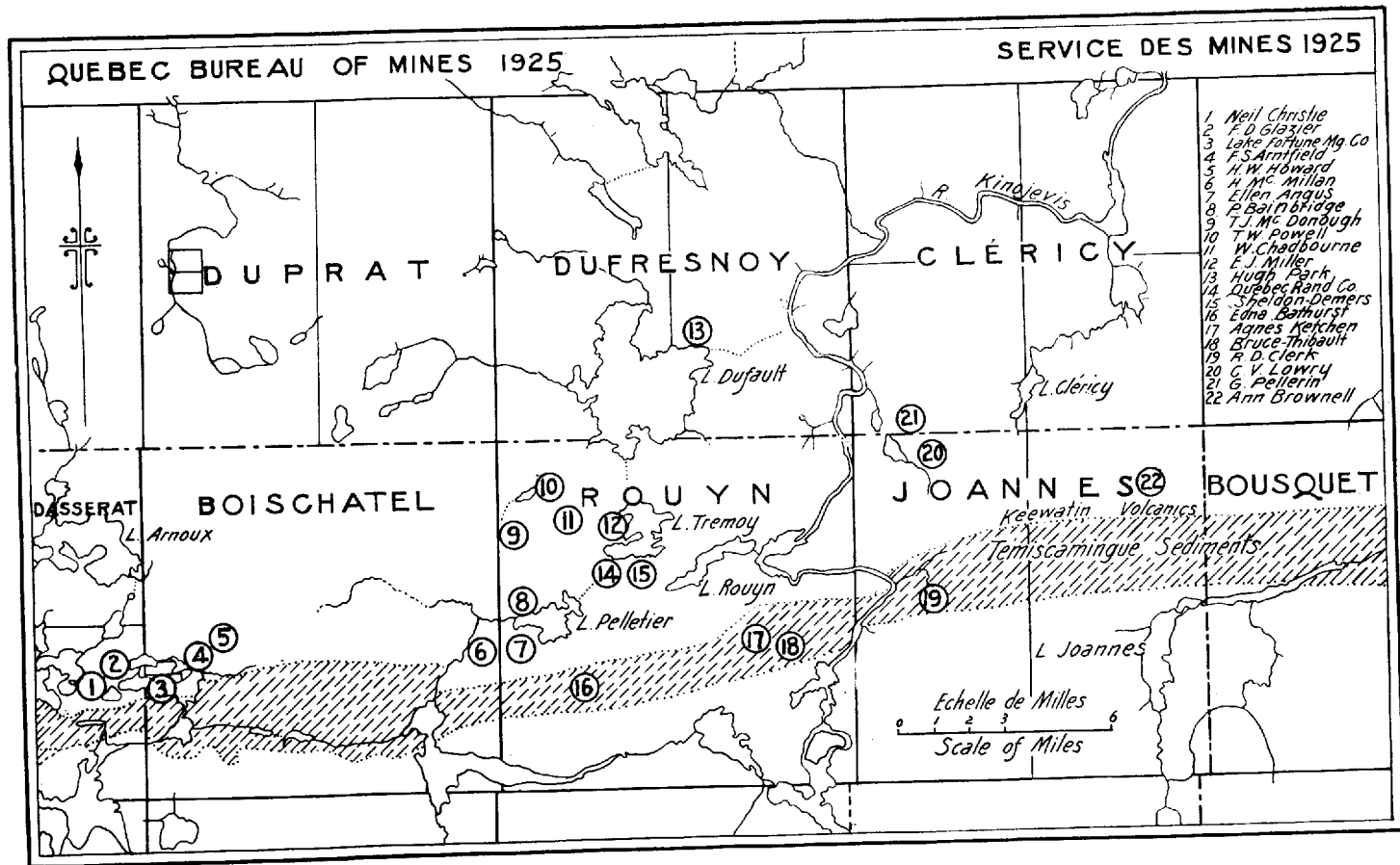
E. J. Miller Claim.—Of all the mining properties in the new belt, the E. J. Miller claim in Rouyn township is the furthest advanced in development work. It is under Mining License No. 1593 and belongs to the Horne group of claims. The development work done on the Miller claim is usually referred to as "The Horne Mine." This group of claims is under option to the "Noranda Mines Ltd."

In its second annual report the company states that surface work done on the E. J. Miller claim in 1924 consisted in 36 trenches, of a total length of 2,678 feet, and in 16 test pits of an average depth of ten feet. The underground work comprises two shafts, drifts, cross-cuts, and 53 diamond drill holes of a total length of cores of 16,497 feet.

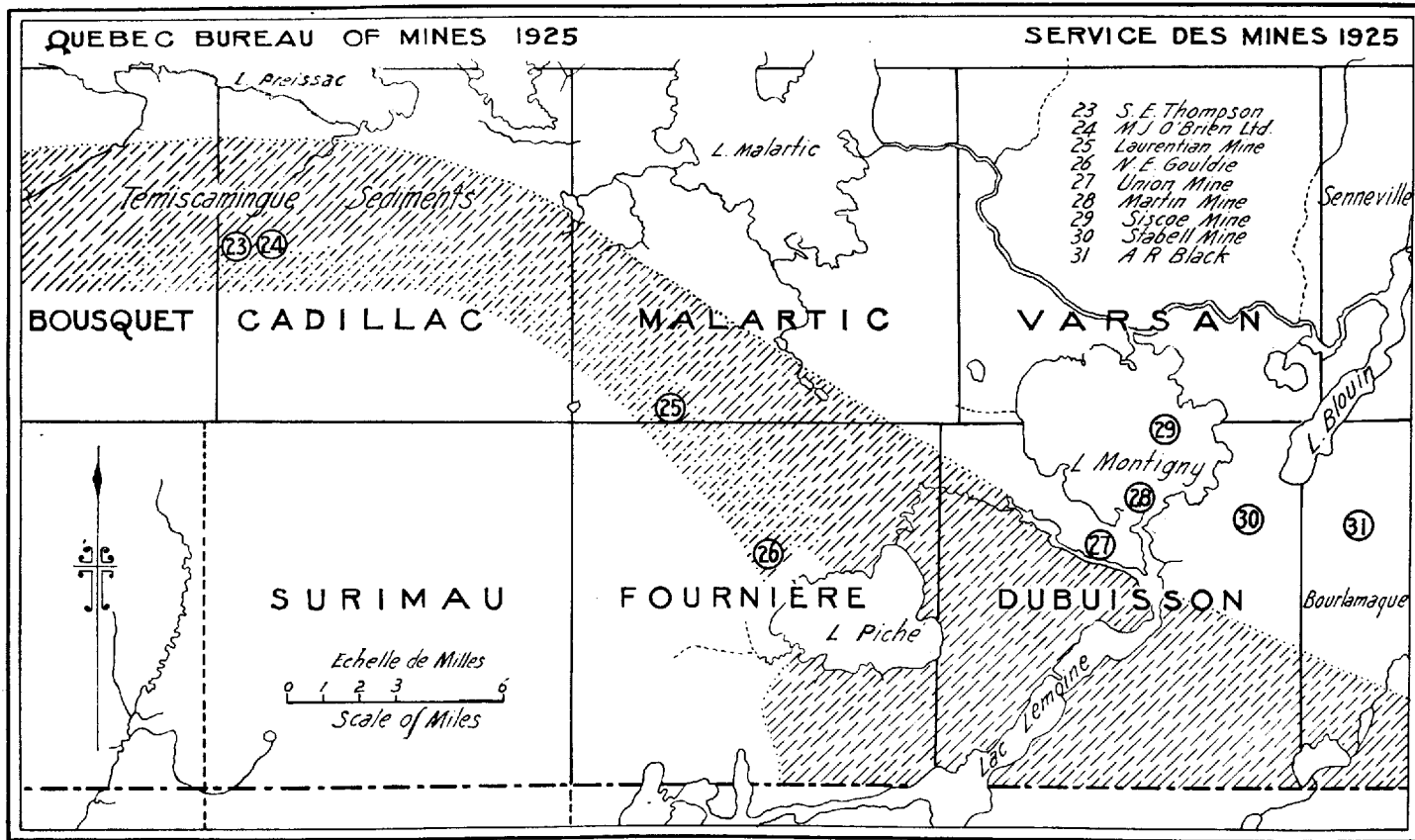
Shaft No. 1 is situated in the south-east corner of the claim. It is located on the eastern slope of a rocky hill, at a level of 80 feet above lake Tremoy. The sinking was begun in July, and at the end of the year it had reached a depth of 124 feet. At the 106-foot level, drifts and cross-cuts were driven in five directions, measuring a total length of 1,256 feet. This is a two compartment vertical shaft, each section measuring $4\frac{1}{2} \times 4\frac{1}{2}$ feet, inside; its head-frame is 30 feet high. Near the opening of the shaft is a boiler house, containing two locomotive steam boilers, 50 and 60 H.P., respectively. The steam hoist is a Lidgewood, 8 x 10, and there is a Canadian Ingersoll Rand air compressor of 500 cubic feet of air.

The report of the managing directors gives interesting data of which we give an abstract. The underground workings have given clues as to the mode of occurrence; the deposit consists of a series of overlapping lenses. By the end of the year four lenses had been outlined, designated in the order of their discovery and development as deposits A, B, C, D, respectively. The shaft is in solid sulphides from grass roots to level 106. The average of the assays from a careful sampling of the four sides of the shaft, with channel samples taken every five feet in depth, gave 14.69% of copper and \$6.66 of gold or an average value of \$44.45 a ton with the copper taken at 13 cents a lb. At 106 feet the shaft struck the country rock owing to the dip of lens "A" towards the south; the main level, driven to the south, goes through 100 feet of ore, the average thickness of which is 40 feet, as shown by eight diamond drill holes.

From a point in the level, 140 feet south of the shaft, two cross-cuts have been driven towards the east and towards the west respectively. At a point in the west cross-cut, 40 feet from the level, a second lens "B" was encountered, of a length of 61 feet. An average assay gave 7.77% copper and \$6.86 gold, equal to \$27 a ton. This lens extends north for a width of 40 feet at least, and from a diamond-drill hole bored in the main level, it is continuous for a depth of at least 100 feet.



Sketch map of western part of gold belt, Abitibi and Temiscamingue counties



Sketch map of eastern part of gold belt, Abitibi county

Lens "C" is 65 feet east of the main level. It measures 45 feet in length, and an average content of 7.07% copper and \$2.11 gold, or \$20.48 a ton. The development work necessary to block out the three lenses was not quite completed, but the company estimates at 239,000 tons the quantity of ore between the surface and the first level, valued at \$6,567,000.

Beside these three lenses outlined by the underground workings, two others have been located by diamond-drill holes in the vicinity of shaft No. 1. Lens "D" is situated to the north of the shaft and lens "E" is 350 feet to the east; the data as to their volume and contents are still incomplete, but they have been estimated at 85,000 tons valued at \$2,125,000, and 127,000 tons, valued at \$2,195,000, respectively.

Keewatin rocks outcrop near No. 1 shaft. They are flows of acid volcanics, of rhyolite type, cut by irregular intrusions of a crystalline dark green rock, of a quartz diorite type. In thin sections this rock shows an abundance of hornblende, sometimes altered to chlorite, surrounding idiomorphic elongated crystals of plagioclase; as accessory minerals there are quartz, feldspar with micrographic texture, epidote, a little calcite, and ilmenite with its alteration leucoxene. At the 106 foot level station, in the shaft, the ore is observed to be in contact on the north, with a rock, apparently massive, pale yellow in colour with green tints, soft and soapy to the touch, made up of transparent scales and microscopic fibres of a variety of serpentine.

Shaft No. 2 is situated 1,100 feet to the northwest of No. 1, near the west line of the claim. It is sunk in a dark green rock, very chloritic from the decomposition of the ferro-magnesian minerals; the rock is apparently a very fine grained variety of diorite, containing irregularly disseminated sulphides, mainly pyrrhotite, a little chalcopyrite and large cubes of pyrite. This deposit is designated by the letter "F". Sinking of this shaft was started in October 1924, but after having reached a depth of 73 feet, work was discontinued, owing to the compressed air plant being insufficient for the number of drills. The company estimates this deposit to contain 160,000 tons of an ore, assaying \$6.90 of gold and one per cent in copper, representing an average value of \$9.50 a ton.

The deposits which have just been briefly described insure to the Horne mine a large tonnage of copper ore. The estimates arrived at by the engineers of the Noranda Mines Ltd., based on surface work, underground workings and diamond drill cores, as known at the end of the year 1924 have been condensed in the following table, estimating the copper at 13c. a lb.

	Tons	Values per ton			Gross Value
		Gold	Copper	Total	
Ore partly blocked out.	239,000	\$ 6.21	8.18%	\$ 27.48	\$ 6,567,400
Ore determined by diamond drilling.....	372,500	5.15	4.04%	15.65	5,840,000
	611,500	\$ 5.57	5.66%	\$ 20.29	\$12,407,400

Near the north-east corner of E. J. Miller claim, (Mining license No. 1593), on the line which separates it from the E. H. Horne claim (Mining license No. 1677), at a distance of 1,100 feet from shaft No. 1 in a northeast direction, a rhyolite breccia, impregnated with gold-bearing pyrite, has been uncovered. This deposit "G", differs from the others by the complete absence of copper sulphides. The extent of this deposit is not yet known. Some stripping has been done, as well as a few diamond drill holes, but are insufficient to venture estimates.

The massive copper-bearing sulphide lenses of the Horne mine are not the only ones in the region. To the west of this property, near the Boischatel line, on the T. J. McDonough claim (Mining license No. 1900) which now forms part of the group controlled by the Amulet Gold Mines Ltd., Mr. Pilon in the course of surface work, has proved the presence of chalcopyrite, disseminated in a dark green schistose rock, rather decomposed, mainly made up of chlorite, with grains of quartz, feldspars, ilmenite and calcite.

The discovery of other deposits of chalcopyrite has also been reported from the townships of Duprat and Dufresnoy.

The Noranda Mines Ltd. has built its main camp on the Horne claim, on the west shore of Tremoy Lake. Cabins have been erected as residences for the superintendent and the engineering staff, as well as buildings for offices, assay laboratory, two sleeping camps with metal beds for one hundred men, cook-house, dining hall, sheds and store houses, a root cellar, and a stable for twelve horses. As a protection against bush fires a space of thirty acres has been cleared. Moreover the company has built $7\frac{1}{2}$ miles of roads through the bush, of which 2 3-4 have been corduroyed between Rouyn and Tremoy lakes.

Stabell property.—On lots 53 to 58, range VIII of Dubuisson township, the Stabell Gold Mines, Ltd. carried on important prospecting and development work during the years 1923 and 1924. This was started by diamond drilling exploration to the total extent of 4,300 feet. In October 1923, vertical shaft sinking was begun in the north-east corner of lot 53. At the end of the year 1924, the shaft had reached a depth of 620 feet, and lateral workings driven at 285 and 600 feet respectively. At each of these levels about 650 feet of drifts and cross-cuts were driven.

The surface plant comprises a power-house, with a 90 H.P. boiler, brick encased, a seven-drill air compressor, and a Chalmers hoist.

The camp site was chosen on a sandy stretch of ground, to the south of the low dome on the summit of which the shaft is located. A boarding house, a kitchen with dining hall, an office building, an assay laboratory, storage sheds and other necessary buildings have been erected. Several acres of land have been cleared as a protection against bush fire.

The president of the Stabell Gold Mines Ltd., is Mr. R. W. Eberly, of Buffalo; Mr. R. W. Brigstocke, M. E. is in charge of the development work.

Although the Stabell property is 24 miles distant from the railway, in an air line, it is fortunate as regards means of communication. During the season of navigation, the distance from Amos to the lower bay of Blouin lake can be covered in a few hours by motor boat. During the winter, travelling is over a very good snow road; the distance from the mine to Barraute, a station on

the Canadian National Railways, is 27 miles. The northern part of this road is used all the year round by the settlers, and it is intended to improve the lower part into a summer road, which will give access, all the year round by road, into the townships of Dubuisson and Bourlamaque.

The geological conditions at the Stabell mine were worked out by Bancroft (1), Mailhiot (2) and Cooke (3). The rocks underlying that part of Dubuisson township are deeply altered Keewatin basalts, cut by numerous dykes of granodiorite porphyry, a grey rock with medium sized phenocrysts of hornblende and of white feldspars.

At the Stabell mine the deposit is in the shape of a quartz fissure vein, which was followed on the surface for a length of 1,000 feet (4) on a rocky dome which rises some 40 feet above the general level of the surrounding country. The vein strikes N. 60° W. and dips 25° to the north. It is cut at low angle by a granodiorite dyke, seven to nine feet wide.

Dr. Cooke gives the following description of the vein:—"The vein itself is exceedingly interesting. It consists of quartz with sulphides and a little calcite, forming a succession of lenses of varying length and width. The lenses vary in width from 1 to 3 feet, averaging nearer the smaller figure. Near the dyke they are connected to form a continuous vein that widens and narrows again; but about 800 feet from the dyke they begin to be entirely unconnected with one another and form isolated masses. The sheared wall-rock is more or less impregnated with sulphides for a few inches from the vein, although in one place where a subsidiary veinlet joins the main vein there is a sulphide impregnation 20 feet wide or more. The sulphides of the vein are auriferous chalcopyrite and pyrrhotite; they fill cracks in the quartz which has been rather badly shattered. The main gold values are found in the chalcopyrite. The pyrrhotite carries very low values, from \$1 to \$2 a ton.....

"Assays have proved that the gold values of the vein are concentrated almost wholly in the chalcopyrite, and therefore, vary

(1) Annual Report Mining Operations, Quebec, 1911.

(2) Annual Report Mining Operations, Quebec, 1919.

(3) Summary report 1923, Part C. I. Geological Survey of Canada.

(4) The Stabell Mine, by R. W. Brigstocke, Canadian Mining Journal, August 1st, 1924.

according to the amount of that mineral. The pure chalcopyrite is said to assay \$200 to \$300 a ton. No free gold has yet been found. Near the dyke the tenor of the vein material is \$10 to \$40 a ton; the schist impregnated with sulphides assays \$4 to \$5 a ton. At 600 feet from the dyke, where chalcopyrite disappears from the vein, the gold values similarly disappear, save for the small values yielded by the pyrrhotite." (1)

GOLD-BEARING PYRITE DEPOSITS

F. D. Glazier Claim.—(Mining License No. 2030).—On this claim located in Dasserat township, Mr. F. D. Glazier found visible gold in a narrow quartz stringer in the course of stripping work during the summer 1924. Near the north-west shore of Lake Fortune a rounded rock elevation is observed, entirely barren of vegetation by a recent bush fire. This is an outcrop of the granodiorite. The dark green rock, holocrystalline, medium grained, is greatly altered; it is composed of orthoclase crystals having a micrographic structure, elongated plagioclase crystals, quartz grains, chlorite, pyrite and calcite. The ferromagnesian constituents have been completely altered to chlorite which is very abundant in the rock.

This granodiorite is cut by an amphibolite dyke 30 inches wide having a strike of N. 70° W. This dyke is composed, in the main, of long fibrous aggregates of hornblende and biotite altered into chlorite, as well as numerous grains of leucoxene and calcite.

The dyke has been sheared and the fissure subsequently filled with quartz in which is found visible gold accompanied with some sulphides.

Lake Fortune mine.—This mine is situated in Block A, Boischatel township, and is the property of the Lake Fortune Mining Co. Ltd. Messrs. Alderson & Mackay, mining engineers of Montreal, are in charge of the operations. During the year 1924, important prospecting and development work was carried out: surface strippings, shaft-sinking and underground work. The surface trenches, opened half way between lakes Fortune and Renaud, have

(1) Summary Report 1923, Part C. I, Page 82. Geological Survey of Canada.

uncovered a shattered zone near a syenite porphyry intrusion. The porphyry has further been observed on the south east shore of Lake Fortune, where rich specimens of visible gold accompanied by tellurides and molybdenite have been found. The vein has a strike of N. 75° E. and dips to the north at an angle of 45° apparently. In order to prospect in depth Messrs. Alderson & Mackay started sinking a shaft on the east side of Lake Fortune in a syenite intrusion. At a depth of 20 feet, this shaft was abandoned and another was started 200 feet more to the south. The latter shaft, called No. 2, was started in January 1924. It is now a two-compartment shaft 135 feet deep. At the 125 foot level a cross-cut was driven towards the north, 240 feet, entirely in Keewatin greenstone. At a distance of 163 feet from the shaft the cross-cut cuts a sheared zone 70 feet wide and two short drifts have been driven along this zone on each side of the cross-cut. To obtain further data, at 50 feet from the shaft another gallery was driven towards the west over a length of 150 feet. From the end, a second cross cut 180 feet long was driven towards the north.

Dr. Cooke, who in 1923 examined the geology of the property of the Lake Fortune Mining Co. Ltd., gives the following description of it (1). The principal workings and the buildings lie in the small area between Fortune and Renaud lakes. The rocks are Keewatin basalts, cut by two dykes of syenite porphyry, highly irregular in shape, and very variable in width. The larger dyke has an average width of 12 to 15 feet, but widens in one place to more than 100 feet; the smaller is about 15 feet wide at its largest exposure, but narrows down to a stringer less than one foot wide. The ore deposit lies in a strongly sheared zone, presumably formed by faulting, that strikes slightly north of east (astronomic) and has been traced from the middle of the east side of MacDonald lake as far as lake Fortune, where it passes beneath the lake. It averages 6 to 12 feet in width, for the most part, except for a distance of some 5 or 6 chains at the eastern end, where the sheared belt is 200 to 300 feet wide. Throughout the greater part of the observed length there is very little vein material in the sheared zone; between Renaud and Fortune lakes, however, it contains much quartz, carbonate, and sulphides. It is to be noted that the mineralization

(1) Summary Report, 1923, Part C. I, Geological Survey of Canada.

is near the dykes of syenite porphyry, an association that appears to argue a genetic connexion between the two. On the other hand the larger of the two porphyry dykes is cut by the shear zone in one place, and altered to sericite schist; so that the period of vein formation must have been later than that of the dykes.

The principal vein materials are quartz, a carbonate (ankerite with more or less calcite) fuchsite (a chrome lithium mica), pyrite, chalcopyrite, tellurides, and free gold. Robert Harvie, who examined the deposit in 1910, succeeded in separating a small quantity of the telluride, and found by analysis that it contained about 25 ½ per cent gold and 42 per cent silver, corresponding approximately to the formula for petzite $(\text{Ag Au})_2 \text{Te}$. Mr. V. Dolmage, however, examined a polished surface of the same ore under the reflecting microscope, recently, and determined that two tellurides are present, which appear to be petzite and sylvanite $(\text{Au Ag}) \text{Te}_2$. The precise determination is difficult, however. These tellurides are dark grey to black, opaque minerals, occurring in very small grains, as far as observed. They are slightly softer than calcite.

The gold values in the veins, according to Harvie, are obtained from the tellurides and the free gold. He states that the pyrite and chalcopyrite in the veins, on being assayed, yielded very low values."

F. S. Arntfield Claim (Claim T-298).—During the fall of 1923 Mr. F. S. Arntfield and associates staked an area of 1,867 acres in mining claims to the east of Lake Renaud, in Boischatel township, whence a discovery had been reported in what now appears to be a very wide fractured zone. This group of claims is the property of the Arntfield Gold Syndicate of Toronto. Without any loss of time this syndicate inaugurated a campaign of active and systematic prospection under the direction of Messrs. Alderson & Mackay, mining engineers of Montreal. The work effected on the claims during 1924 consisted in numerous surface cross-trenches along the mineralized zones, diamond drilling of 11 holes giving a total of 3,159 feet and in the plotting of a geological map of the property showing the outcrops, the nature of the rocks and the strike of the various shattered zones. Several substantial log buildings were erected for the men, and to afford easy access to them a road, one mile long, was cut between the camp and the east shore of Lake Renaud, a part of which was corduroyed.

These claims are located along rocky hills rising between 25 and 100 feet above the general level of the region, to the north of Wasa creek. Outcrops are numerous more especially on the western claims of the group. The overburden is thin on the upper levels and in the low parts the borings have not shown any greater depths than 30 feet to bed rock. The outcrops are Keewatin volcanics cut by syenite porphyry in the form of dykes and of irregular intrusions. Some varieties of this rock are remarkable by the size and by the red colour of the orthoclase phenocrysts. The groundmass, light coloured, is composed of very fine grains of feldspar, quartz, green mica, chlorite, grains of iron ore and numerous crystals of calcite regularly disseminated through the rock.

Stripping work in a low part to the north of a hill on the F. S. Arntfield claim has uncovered a mineralized schistose zone having a strike N. 71° W. (astronomic) with a dip to the north under an angle of 55°.

In their first annual report (1), published at the end of the year, the engineers report having followed this zone over a distance extending 5,000 feet, from the Baker claim on the east as far as the Francœur claim on the west. Its average width is 150 feet. The fracturing is wide spread, for on the Arntfield property there are three other shattered zones already located: one, 250 feet south of the main zone and two others 500 and 1,000 feet respectively to the north.

The rock of these zones appears to have been intensively sheared; the fractured planes are numerous and close together. It has the appearance of a banded schist where narrow bands, pale pink in colour alternate with green stringers. The center of the zone is more intensely schisted especially in the vicinity of the lenticular veins of white quartz.

Various carbonates, quartz, muscovite, a little feldspar constitute the schistose rock, and moreover it contains numerous grains of pyrite widely disseminated and a little chalcopyrite. On assay the mineralized rock shows gold values. In the eastern part of F. S. Arntfield's claim six cross-trenches on the zone, in a distance

(1) First Annual Report on Arntfield Gold Syndicate claims by Alderson & Mackay, December 1st, 1924.

of 530 feet, have given assay returns in gold from \$3.60 to \$6.46 on widths from 10 to 30 feet. Eleven diamond drill holes, of a total length of 3,159 feet of cores, spaced over a distance of 765 feet so as to include the above cross-trenches, gave an average assay value of \$4.81 on a mineralized section of the core averaging 6.6 feet in thickness. The presence of ore in depth is therefore assured for at least 100 feet from the outcrop.

H. W. Howard claim (Mining License No. 1860).—This claim is located in the south-east corner of a block held under Mining license 1860, in Boischatel township, by the Chance Syndicate of Montreal. In the course of the assessment work required by the Mining Law, a brecciated mineralized zone of the Keewatin volcanics cut by numerous small intrusions of igneous rocks, diabases, grey and red porphyries, was uncovered on the north half of the Howard claim, one mile to the north-east of the discovery on the F. S. Arntfield claim.

The rocky hill on which the assessment work was performed consists of Keewatin volcanics similar to those which generally underlie the region. They are cut by a quartz diabase, and by at least two intrusions of syenite.

One of the syenite dykes strikes east and west and outcrops along the center of the brecciated zone, whereas another dyke transversally cuts the first one and the mineralized zone, indicating an intrusion more recent than the period of mineralization. The rock of the first syenite dyke is of a grayish colour with a pinkish tint. It is composed, in the main, of cream coloured orthoclase crystals and microcline, in a very fine grained groundmass of feldspar, biotite, hornblende, calcite, zoisite, cubical crystals of pyrite and a few quartz grains. The rock of the second dyke is reddish, the phenocrysts of alkaline feldspars are red and elongated. The groundmass is mainly composed of feldspars, a little calcite, chlorite, epidote, hornblende, sphene and quartz.

On the Howard claim the mineralization took place in a brecciated rhyolite, filling a fracture with an east and west strike. The rhyolite is very tough and pale gray in colour; it contains small almond shape amygdules, elongated in the same direction and filled with vitreous quartz. Numerous small pyrite octahedra are

disseminated in the rock, and these are occasionally partly surrounded by leucoxene.

In places the pyrite is segregated into small pockets of sulphides, with grains of chalcopyrite and crystals of galena. On the glaciated surfaces the fragments of rhyolite in the breccia are seen surrounded by stringers of magnetite.

The mineralized zone measures at least 800 feet in length. Its maximum width reaches 120 feet. It is reported that its extension to the east was picked up near the eastern line of the claim.

H. McMillan claim (T-412).—This claim, located to the east of Pelletier river, in Boischatel, is part of a group of several claims of a total area of 1,082 acres, the property of The Huronian Belt Co. Ltd., a strong British mining organization. This company owns several other groups of claims in various townships in north-western Quebec.

Following an interesting discovery on the McMillan claim, in 1924, the Huronian Belt Co., has devoted a great deal of attention to this property. During the whole summer season a gang of fifteen men carried out prospecting work, mostly stripping, trenching and test-pitting, under the direction of Mr. J. F. B. Davies and Mr. Martin Wright, mining engineers. At a distance of 400 feet from the eastern line of the claim a fissured zone, striking east and west was uncovered in the Keewatin volcanics.

The rock in the zone, has been so altered by shearing and by replacement, that it has lost all trace of its original character; it is now a microcrystalline rock, very schistose, soft, light gray to dark gray in colour; it is rich in magnesian carbonates, with chlorite, sericite, a few phenocrysts of vitreous quartz and grains of pyrite. In the trenches can be seen irregular masses of quartz and calcite. The schist strikes N. 70° W. and dip 65° to the north. As a rule, near the quartz masses the iron sulphide cubes are more numerous and appear to be sufficiently gold bearing to constitute an ore. The officers of the company report the presence of a belt, eight feet wide, followed for 200 feet in length, of which the average of assays gave \$10 a ton.

In the fall the company started the erection of buildings for a permanent camp. Diamond drilling was also begun to ascertain the continuity and the nature of the deposit in depth.

Rouyn Gold Mines, Ltd.—This company owns a group of four mining claims to the south of Pelletier lake, in the western part of Rouyn township; they are the following claims: N. C. Pearce, (Mining license 1851), N. H. Pearce (M. L. 1852), D. H. Angus (M. L. 1853) and Ellen Angus (M. L. 1854). These claims cover the possible eastern extension of the fissured zone brought to light on the H. McMillan claim.

In the course of the first six months of 1924, the company did 2,500 feet of diamond drilling of which three holes are on the Pearce claims, and four on the Angus claims. Large camp buildings have been erected on the N. C. Pearce claim.

During the summer and in the fall, the company undertook exploration work on the Ellen Angus claim, where the "Hacker" vein had just been discovered, immediately east of the McMillan claim. This vein, striking N. 65° W., comprises a sheared zone, rich in carbonates and in chlorite, with irregular lenses of white quartz with creamy coloured carbonates. The mineralized part shows a slight oxidation on the surface, not exceeding half an inch in depth. The quartz, as a rule, is not mineralized although it contains a few grains of iron pyrites. It is mostly in the country rock that crystalline auriferous pyrite is found.

The outcrops in the vicinity of the Hacker vein, are of Kewatin volcanics, grayish in colour. They are of the type prevailing in the region.

T. W. Powell claim (Mining License No. 1759).—This claim belongs to a group of four, owned by the Powell-Rouyn Gold Mines, Ltd. It is located south-east of Héré lake, in the north-western corner of Rouyn township. It is on this claim that T. W. Powell prospector, discovered in September 1922, a gold-bearing quartz vein which outcrops over considerable distance.

On October 20th 1923, by an agreement between the parties, the control of the Powell-Rouyn Gold Mines Ltd., was taken over by the Nipissing Mining Company Ltd. After doing a considerable amount of underground work on this vein the company abandoned the option in July 1924. The work done comprises a shaft 225 feet, inclined at an angle of 55° to the north-east, and some drifting. On the surface a hoist was set up, an air compressor and two locomotive boilers.

Dr. Cooke who examined the Powell vein in the course of the summer in 1923 gives the following description of it: (1) "The Powell vein lies within the T. Powell, Fletcher, and H. Powell claims. It has an average strike of north 30 degrees west, and dips east at an average angle of 60 degrees to 65 degrees. Both dip and strike vary a good deal over short distances, however. The width averages from 3 to 6 feet. The vein has been traced for a distance of 3,600 feet, and as it is very narrow at both ends, this distance is probably close to the total length. There is also a gap of about 250 feet, where the vein appears to pinch out temporarily about 1,000 feet from the northern end. That part of the vein north of this gap will herein be termed the northern vein, the remainder the southern vein. The vein materials are mainly white quartz, with more or less pyrite; the wall rocks are somewhat altered by addition of pyrite, carbonate, and in places some chrome mica or fuchsite. In a few places a crystal of chalcopyrite may be found.

The original vein fissure was evidently formed by faulting, as striae occur in many places on the walls. At this point the northern vein is about 6 inches thick, and consists chiefly of barren quartz, with little or no sulphide in either vein or wall-rock. Some 200 feet south the thickness increases rather rapidly to 3 feet, and the proportion of sulphide also increases considerably, particularly in inclusions of country rock. The increased thickness and sulphide content coincide with a change in the character of the country rock. On the north the vein lies in a grey lava of about the composition of trachyte, and where the thickness changes it passes into an intrusive body of porphyritic granite. The granite is composed mainly of albite and quartz, in proportions of about 3 to 1 together with a very few grains of chlorite, hematite, and pyrite. It is strongly porphyritic. Phenocrysts of both quartz and albite, up to 2mm in diameter, form roughly 15 per cent of the mass; the groundmass has an average grain of 9.1 to 0.2 mm.

The vein lies in granite for a total length of about 600 feet and in this distance the width varies from 2 to 12 feet. The wider parts

(1).—Summary Report 1923. Part C I. Geological Survey of Canada.

are found in the rather numerous bends; narrower parts form the straight lengths connecting the bends, so that the vein is a series of lenses connected by narrower parts. The wider parts of the lenses tend to be well mineralized, but the narrower parts are rather barren."

Chadbourne Claim, Block No. 1.—The Chadbourne claim, now constituting Block No. 1 of Rouyn, is located half a mile west of Tremoy lake. It belongs to a group of claims owned by the Noranda Mines Ltd. This company has erected, near a small lake in the south-west corner of the claim, a camp consisting of eight very substantial log buildings for office, sleeping house, kitchen, dining hall, store-room for supplies, to accomodate easily forty men.

The Chadbourne deposit is half a mile north of the camp, near the north line of the claim. According to Dr. Cooke the rocks are acid lavas, rhyolite or dacite, cut by some dykes of red feldspar porphyry. "The dacite is rather fresh, tough, very fine grained, and often quite dark in colour. The porphyry is of a strikingly bright red. The phenocrysts are sometimes grouped closely, so as to constitute half the volume of the rock. They are of feldspars varying from albite to albite-oligoclase. The groundmass is mainly composed of the same feldspars with abundant quartz, a little sphene, magnetite and chlorite.

"The structure of these lava is interesting. The general strike is N. 55° W. the dip practically vertical, the upper surface facing south. In a sharp bend of an overturned fold the strike over a distance of 600 feet changes to N. 40° E., the upper surface facing north-west, so that the layers have been bent at right angles. It is in this bend that the Chadbourne deposit is located.

"The deposit outcrops on a small elevation, triangular in outline, approximately 500 feet in a north-east direction and 400 feet in a south-east. It is covered by an iron hat, hardened, varying in thickness between a few inches and several feet. This is due to the oxidation of the sulphides in the rhyolite. The lava beds are traversed by several, rather ill defined, fractured zones. These are apparently oriented north-west-south-east, and the dip which is rather indistinct appears to be about 45° to the north-east. Quartz,

calcite and iron sulphides fill up the voids around the broken fragments of the country rock. The veins and the surrounding rocks are freely mineralized with pyrites. The tenor in gold of samples from these brecciated zones is very promising, and the work is being pushed forward to determine the dimensions, the strike, the dip and the extent of the deposit."

During 1924 the company cleared an area of 10 acres, and sank a vertical shaft to a depth of 154 feet from the summit of the elevation. From the bottom of the shaft a total length of 196 feet of lateral workings was driven. The head frame above the shaft collar is 27 feet high. The power house erected near the shaft contains a 60 H.P. boiler, an air compressor of 225 cubic feet capacity and a hoist 6 x 8.

The lateral underground workings have brought to light a mass of strongly mineralized rock, similar to that met on the surface; but in depth this does not seem to contain sufficient gold to make it workable ore. (1)

Lowry-Pellerin claims.—There was found in the north-western part of the township of Joannès, a granite rock the outcrop of which Drs. F. W. James and J. B. Mawdsley, (2) geologists, have followed into Clericy township, up to a point near Cyclone rapids, on the Kinojevis river. It is an intrusive sheet, approximately one mile wide by eight miles in length. The whole extent of this outcrop has been staked out in mining claims.

The composition and the texture of the rock vary considerably. At the southern end of the massif it is generally very fine grained and it contains inclusions of volcanic rocks; in other places it is medium grained. Its colour is a greyish white. It has the composition of a very acid granite, rich in quartz, and poor in dark constituents. It has been altered, the causes of the alteration being as yet undetermined. Certain parts of the sheet are schistose, the feldspars being at times deeply decomposed, and narrow stringers of sericitized and chloritized material are present.

(1)—Second annual report of the managing directors.

(2)—Clericy and Kinojevis Map Areas, by W. F. James and J. B. Mawdsley, Canadian Mining Journal, March 6th, 1925, p. 243.

In its fresher phases the rock shows white quartz, alkaline feldspars, some lime-soda plagioclases, a little sericite and chlorite, and as accessory minerals, sphene, zircons, leucoxene, calcite, epidote and iron pyrites cubes.

In Joannès township, on claims T-1620 and T-1621, of the C. V. Lowry group, Messrs. Bailey and MacLeod did some stripping in the fall of 1924, and have uncovered some lenses of white quartz, in a somewhat altered granite, and mineralized by iron pyrites. Near the walls a little visible gold has been observed. The strike of one of these lenses is N. 60° E. and its width 40 inches.

In Clericy township, on claim T-1284 of the Pellerin group, one mile north of the H. O. Sullivan base line, MM. Provencher and associates have done some stripping, uncovering a quartz vein striking N. 40° E. (magnetic), and dipping 45° south. It has a width of 36 inches. The vein has been trenched over a length of 86 feet and appears to pinch at both ends. The quartz is much shattered and contains iron pyrites. The mineralized parts of the quartz veins on the Lowry and Pellerin claims give interesting results in assays for gold.

Brownell group.—The Brownell Exploration Syndicate controls a group of claims in the north-eastern part of Joannès. Mr. Robert Hoffman, who is in charge of the work, has erected a substantial camp on the shore of a small lake on claim T-802, and has cut two trails which lead from his camp to the Kinojevis river on one hand and to Bousquet lake on the other. Some stripping, trenching and other prospecting work has been performed on these claims.

In the central part of the four claims Ann Brownell (T-808), C. Hurd (T-806), J. G. Walsh (T-802) and G. Lyon (T-1791), where the interior corners of the four claims meet, a wide mineralized fissured zone, striking S. 80° E., has been uncovered. One of the veins has a width of 3 to 8 feet and shows on the surface segregations of iron pyrites and tourmaline. Panning of the crushed vein material often gives gold colours.

On the J. G. Walsh claim, 300 feet south and 600 feet east of the north-east corner stake, a narrow quartz vein was brought to light, varying between 6 and 18 inches in width, in which visible gold has been observed over a length of 150 feet.

Laurentian Gold Mines, Ltd.—This company controls Mining License No. 1808, covering lots 13 to 25, range I of Malartic, and some mining claims in the adjacent part of Fournière township. Two logs buildings have been erected, which are used as kitchen and for housing the men. At the beginning of the season this property could be reached by a very poor trail from Malartic river.

During the fall of 1923, the company did comparatively extensive exploration work on lots 15, 16 and 17. The rock which in the region outcrops frequently through the overburden, is as a rule a slaty graywacké, in thin beds and fine grained, belonging to the Temiscamingue series. Numerous granite dykes, of all sizes cut these sediments. The dykes are intrusive sheets, for their dips and strikes conform with those of the sedimentary rocks which they invaded.

In the main these granites are made up of albite, with perhaps five per cent quartz and two per cent biotite. We detected no true potash feldspar in any of the slides. Pyrite is sometimes present and the feldspar is altered to calcite and sericite. Some of these dykes are granitic in texture, others clearly porphyritic. *

The company put in a few shots in various places near the Blouin base line. Several small veins of white quartz have been uncovered, cutting either the graywacke or the fine grained granite. In these veins are found crystals of pyrite, chalcopyrite, argentiferous galena and pink calcite.

The main exploration work of the Laurentian Gold Mines, Ltd., was performed on lot 17, on the top of a white quartz dome, 300 feet north-west of the camp, and one quarter of a mile from the Blouin line. The outcrop measures 120 feet in length by 56 feet in width. Three trenches were excavated, the longest in a transversal direction to the other two. At the point where the two main trenches cross there is a very narrow dyke of syenite. Grains of pyrite and of chalcopyrite are found in spots in the quartz. Samples from these mineralized spots give gold values on assaying.

* H. C. Cooke, Summary Report 1923, Part C, I. p. 104, Geological Survey of Canada.

Gouldie Claim.—N. E. Gouldie's claim (Mining License No. 2163) belongs to a group of claims controlled by the Fournière Gold Mines Ltd., in Fournière township. This claim is located in the central part of the township, about four miles south of the Blouin line.

During the fall of 1923 Mr. W. D. Gouldie who was in charge of the work for the company began some exploration work on the east part of the N. E. Gouldie's claim, on a wide outcrop of white rock composed almost exclusively of quartz grains in which is present visible gold in comparatively large quantities. In the month of June, when visited, a great deal of stripping had been done and two pits sunk, 14 and 25 feet in depth respectively.

The country rock is a graywacke with bedding planes practically vertical, striking north 52° west. It is similar to the one observed in the south-west part of Malartic. Dykes of a white rock, the composition of which greatly varies, are found in well defined contact with the sediments, with a strike parallel to the bedding. Near the walls the dyke rock is composed exclusively of quartz whereas towards the center it passes to a syenite formed mainly of albite, a few grains of quartz, a little muscovite, sericite, calcite, zoisite, and cubes of pyrite. Near the quartz the syenite has the appearance of a breccia. Numerous stringers and small veins of quartz cut it and surround the feldspathic fragments. There is therefore the appearance of a quartz mineralization having taken place after the intrusion of the syenite.

From the stripping work done transversally to the strike of the sediments the intrusive sheet measures a thickness of 380 feet. Near the south-west wall the dyke apparently is divided longitudinally by a horse of slaty schist 20 feet wide.

This dyke outcrops from place to place over a considerable distance. It has been observed over a length of not less than 1,600 feet to the north-west of the Gouldie discovery and it is reported that it extends into Malartic township.

The test pit No. 2, near the eastern wall of the dyke is 10 feet in diameter and 20 feet in depth. It was sunk in the quartzose part.

In this white quartz, crystals of ankerite, of pyrite, of galena, grains of chalcopyrite and fine visible gold are observed. The mineralization is limited to the part of the dyke next to the walls. The slaty schist cutting the rock contains a good deal of well crystallized pyrite but assays of it do not show trace of gold.

Siscoe property.—The Siscoe Gold Mines, Ltd., carried on some work of exploration during the summer of 1924 on Siscoe island, in Dubuisson township.

During the fall of 1923, while opening a trench from shaft "D" in a direction towards the boarding house a white quartz vein was discovered at a distance of 200 feet from the latter building; it is designated as the "Siscoe vein". This vein has been uncovered by means of a trench 100 feet long. At both ends the underlying rock surface dips under a very deep cover of boulder clay. Owing to this the trenching work was abandoned.

The vein consists of two quartz lenses *en échelons*, connected by a narrow stringer. Its total length is 60 feet and the respective widths of the lenses are 8 feet and 3 feet. The general strike is north 64° east.

The quartz is slightly rusty on the surface. It contains cubes of pyrite and a few specks of visible gold.

The Martin Property.—On the Martin property, on the south shore of lake De Montigny, Dubuisson township, Mr. J. J. Godfrey and associates carried out important exploration and development work in 1922 and 1923. This property had been bought, after a sheriff's sale, by Mr. John Dalton and taken under option by Mr. Godfrey and associates. The work carried out consisted in a total length of 4,500 feet of diamond drill holes, sinking of the shaft from a level of 125 feet to 800 feet in depth, and the driving of drifts and cross cuts totalling 700 feet in length.

The results were disappointing and the option was not exercised.

The surface plant, besides a substantial head-frame over the shaft, consists of a power building sheltering two locomotive boilers and a fixed boiler in a brick covering, a large air compressor and a hoist.

Foisie-Kengrow Claim.—Lots 27 and 28, range VIII, of Dubuisson township, are now controlled by the Union Mining Corporation Limited.

During 1923 and 1924 this company carried out important work of various kinds on the property. Besides building a substantial wharf on the Thompson river, opening a wide road between the river and the camp, clearing several acres of ground, erecting log buildings for the men and for the machinery, a good deal of trenching and test pitting was effected and a shaft was sunk. Previously some diamond drill holes had been put down to an average depth of 400 feet totalling 2,500 feet in length.

In August 1923, the Company began sinking a vertical shaft near the footwall of the vein on lot 27, range VIII. In June 1924 the shaft had reached a depth of 92 feet and work had ceased for the time being.

The power building comprises a locomotive boiler of 60 H.P., a vertical boiler of 30 H.P., a four-drill air compressor and a hoist.

The vein has been uncovered for a length of 200 feet. It is tortuous and throws off numerous tongues into the country rock. The general strike at the eastern end, for a length of two chains, is N. 45° W. and at the opposite end it is N. 15° W. The average dip is 45° to the south-west and the average width is 10 feet. The vein material is white quartz badly shattered with a little tourmaline and native gold. Numerous specimens containing visible gold are obtainable. The wall rock is impregnated here and there with iron carbonate. (1)

A. R. Black's claim.—It is to the persistent efforts of Mr. Robert C. Clark that is due the discovery of gold on the A. R. Black claim (Mining License No. 2053a) in the township of Bourlamaque, three to four miles east of the Stabell property. Mr. Clark who had been prospecting in this region for many years found in the fall of 1923, a first indication of mineralization in the form of a large float of quartz, in which numerous specks of native gold were visible.

(1)—Summary Report 1923, C I page 91, (Geological Survey, Canada, Ottawa.—

The group of claims, C. W. Diamond, S. E. Noble, and A. R. Black, (Mining Licenses 2051, 2052, 2053), is now controlled by Mr. Wm. A. Read, of New York. This property is better known as "Clark-Read Syndicate".

After considerable trenching, Mr. Clark found, 200 feet north of the float, the vein from which this was very probably detached.

Dr. H. C. Cooke visited this property during the fall of 1924, and gave the following description: (1)

"About 4 miles east of the Stabell property, in the northwest corner of Bourlamaque township, is the property of the Clark syndicate. On this group of claims, which is being developed by United States capital, at least two good sized veins have been discovered. The most spectacular discovery is a quartz vein some 6 feet in thickness, where exposed, containing an unusual amount of free gold, accompanied by tourmaline, a good deal of chloritized hornblende, pyrite, and some chalcopyrite. Only about 30 feet of the vein is uncovered, on a small knoll surrounded by swamp. The vein strikes north 70° west, and dips 45° south. Some 1,600 feet east the supposed continuation of the same vein has been uncovered. It is only 2 or 3 feet in thickness, is much less heavily mineralized, and carries little or no free gold. The other vein on the property is about 1,200 feet south of the first. It is for the most part a rather wide net-work of stringers of quartz enclosing fragments of country rock, although in places the stringers unite to form quartz veins several feet in width. Much hornblende and some tourmaline accompany the quartz. The wall rocks and included fragments of country rock are heavily impregnated with pyrite and some chalcopyrite. A shaft was being commenced on each vein at the time of the writer's visit in October, 1924."

ARSENOPYRITE DEPOSITS

Edna Bathurst's claim.—The Edna Bathurst claim (T-371) belongs to a very extensive group, located in the south-west part of Rouyn township, now under option to the McIntyre-Porcupine

(1).—Developments in Quebec. H.C. Cooke p. 349, Bulletin of the Canadian Institute of Mining & Metallurgy, April, 1925.

Mines Ltd. It is on this claim that the first discovery of visible gold in the Temiscamingue sediments was made in the district.

This property is reached by a portage trail, $3\frac{1}{2}$ miles long, from the south-east bay of Lake Pelletier or by a trail, slightly longer, which starts at survey station 37 at the eastern end of lake Kekeko.

During the second half of last year the company had a dozen men doing some trenching work, while carpenters were erecting a substantial log camp.

The Edna-Bathurst claim covers part of a very large outcrop of conglomerate which constitutes a long and wide range, having a direction of north 70° west, the summit of which rises to a height of 125 feet above the level of lake Pelletier. Near the north-east corner of the claim a syenite porphyry intrusion outcrops; the groundmass is dark grey in colour and surrounds numerous phenocrysts of white feldspar. These crystals often measure one inch in length. This porphyry intrusion is large. It outcrops over a considerable distance along the central line of the claim, near the blacksmith shop and especially near post No. 1. Both the porphyry and the conglomerate have been greatly shattered. Along the fracture planes, a mineralizing solution deposited quartz, calcite sulphides, arsenopyrite and free gold.

Near the line between the two Bathurst claims the company did trenching work over a distance of more than 300 feet to uncover a quartz vein, grey-blue in color, striking north 70° west and dipping north 45° to 50° . Its width reaches nine feet but it is not uniform. The quartz is shattered and the numerous narrow fissures are filled with an olive-green substance, composed of quartz, calcite, sericite and numerous crystals of iron pyrites and arsenopyrite, as well as nests of fine specks of visible gold.

Bruce-Thibault Claims.—The claims of George L. Bruce (T-334) and of his neighbour to the west, J. Thibault (Mining License No. 1969), are located $1\frac{1}{2}$ miles south of lake Routhier in the eastern part of Rouyn township. During the course of last summer, the Coniagas Mines, Ltd., of Cobalt, did some exploration work along the line between these two claims which are staked on Temiscamingue sedimentary rocks. The graywackes which are fine-grained

rocks, dark gray in colour, generally underlay these claims except in the very southern part where a hill of conglomerate occurs. In the graywacke are found numerous irregular lenses of bluish quartz.

"The mineralization in this sedimentary band would appear to be of the deep vein type. The quartz in the veins is dark and glassy and carries arsenopyrite, pyrite, occasionally some pyrrhotite and tourmaline—minerals characteristic of the deep-vein type. Free gold and pyrite occur in the veins and the wall rock is impregnated by much carbonate and some pyrite, arsenopyrite and tourmaline." (1)

R. D. Clerk's Claim.—The R. D. Clerk's claim (T-796) located one mile east of the Kinojevis river, in Joannès township, belongs to a group of claims controlled by the Goodwin Exploration Syndicate. On this claim a shattered zone in the Temiscamingue sedimentaries, sheared and rusty, with a strike north 60° west, containing numerous stringers of quartz, was uncovered in the course of the summer of 1924. This zone is rich in pyrite and arsenopyrite crystals. Assays of samples have given very encouraging results.

Thompson claims.—Immediately to the west of the claims controlled by the M. J. O'Brien, Ltd., in Cadillac township, is located the group of 15 claims held by E. J. Thompson.

In the course of last summer the Victoria Syndicate carried on important exploration work, more particularly on claims T-1402 and 1403. A sheared zone cut by a vein-like deposit of quartz was uncovered over a length of at least 800 feet. The lenses of grey-blue quartz are much wider here than on the O'Brien property; they measure up to 15 feet in width of the massive but shattered quartz. With the schist which accompanies the quartz the mineralization zone reaches 20 feet in width. The mineralization is similar to that on the next property. The pegmatitic origin of this quartz is indicated by the presence of feldspar crystals.

To the north occurs an important intrusion of porphyry, 70 feet wide, cutting graywacke rich in crystals of arsenopyrite.

(1).—W. F. James & J. B. Mawdsley,—Canadian Mining Journal, p. 243, March 6th 1925.

It is possible that the mineralized zone of the Thompson group may be the extension of the zone uncovered on the O'Brien property. It is reported that this zone stretches out towards the west, and that it is found on the Graham claims in Bousquet. If so this shear zone would have a length exceeding two miles, and would be the longest yet observed in northwestern Quebec.

M. J. O'Brien's claims.—The mining company O'Brien Mines, Ltd., of Cobalt, holds a group of 10 claims in the west part of Cadillac township. These claims were staked by Mr. Austin Dumont early in 1924. They are reached by Blake river which is a stream emptying on the south shore of Preissac lake. On the east side of the river, 4 miles from its mouth the company has erected, on claim T-1490, a camp comprising amongst others two substantial buildings measuring in size 20 feet by 35 feet.

Since June 1924, it has actively pushed exploration work. On claim T-1492 a main mineralized zone has been uncovered over a length of 1400 feet. Other zones on which less stripping has been done have been located on claims T-1492, 1493, 1494 and 1495.

The main zone appears to be a sheared section in Temiscamingue conglomerates and graywakes containing in the center elongated lenses of grey blue quartz in a much carbonated wall rock. The strike of the zone is the same as the conglomerate, generally east and west. To the south of this plane, syenite porphyry intrusions outcrop with orthoclase phenocrysts. It also contains biotite and much tourmaline. The quartz shows in certain places narrow veins, while in others it constitutes lenticular masses several feet wide. The mineralized section reaches up to 12 feet in width. In the quartz near the walls may be seen numerous fine specks of native gold accompanied by tourmaline, pyrite and arsenopyrite well crystallized. Early in October it was reported that the company had practically uncovered a workable deposit 500 feet long with an average width of 7 feet. In December the company started sinking a mine shaft.

Other discoveries.—There are several other claims on which exploration work has brought to light interesting deposits. The following ones amongst others:

Neil Christie claim (Mining License No. 1772b) located in the

south east corner of Dasserat township. On this claim the Coniagas Mines Limited, of Cobalt, has carried out important exploration work during the summer of 1924. Trenching has brought to light the existence of a schistose zone rich in carbonate minerals containing gold bearing pyrite and chalcopyrite and a few stringers of quartz.

Hugh Park Claim (T-151), close to the north-east bay on lake Dufault, in Dufresnoy township. Mr. Fred MacLeod has uncovered a pyrite deposit of comparatively large dimensions in a slightly schistose phase of a Keewatin rhyolite.

On P. Bainbridge claim (Mining License No. 1844) the Argonaut Gold Mines Ltd., has uncovered a mineralized vein approximately nine feet wide consisting of a schist high in carbonate minerals, its colour varying from pale grey to pale red accompanied by white quartz and calcite, mineralized with pyrite and a little chalcopyrite.

Agnes Ketchen Claim (Mining License No. 1986), south of lake Rouyn, is also underlain by volcanic rocks. The formation here is a carbonate and schistose rhyolite or a rhyolite tuff, greyish green in colour, completely covered by limonite derived from surface oxidation of the carbonates. The vein has been uncovered for a length of 50 feet, its width varying between 8 and 18 inches. The principal gangue minerals are ankerite and siderite which occur in rhomboidal crystals in the quartz and a few needles of tourmaline. Pyrite, chalcopyrite and a small quantity of pyrrhotite are found in the quartz but they are usually found quite concentrated in the wall rock on each side of the vein. Particles of native gold are visible in the quartz.(1)

To the south of lake Tremoy, in Rouyn township, on claim T-281, The Quebec Rand Ltd., has excavated several trenches near the road which connects this lake with Rouyn lake. In these trenches the presence of at least two veins, well mineralized with iron pyrites, finely crystallized, has been observed. During last fall the company erected the necessary buildings for the accommodation of 40 men.

(1).—Summary Report 1923. Page 143, Part C I. Geological Survey of Canada.

To the west the Sheldon-Demers claims (Blocks Nos. 8 and 9), the Dasserat Rouyn Goldfields Ltd., has effected some rather extensive work during the course of 1924. Owing to the very thick overburden of stratified clay which covers these claims, deep trenches have had to be excavated to reach the underlying rock surface. This exploration work has shown the presence of a well mineralized vein 6 feet wide cutting a granite-like rock.

METALLURGY OF NORTHWESTERN QUEBEC ORES

The difference in character between the various kinds of ores of northwestern Quebec is so marked that different metallurgical treatments will have to be resorted to. The Ore Dressing Laboratory of the Mines Branch, Ottawa, realizing the importance of adopting the most suitable methods, has begun an investigation which cannot but be most useful and which may prove a large factor in hastening the development of the new mining region.

The following notes are extracted from an article written by Mr. W. B. Timm, Chief of the Ore Dressing Division of the Mines Branch, of the Federal Department of Mines, Ottawa.

“Although the treatment of the gold ores of northwestern Quebec presents difficult metallurgical problems, the history of the metallurgy of complex ores indicates that an economic treatment will be found, provided sufficient ore reserves are available. The Mines Branch, Department of Mines, Ottawa, realizing the complex character of the ores as compared with the ores of northern Ontario, is experimenting in a small way on possible methods of treatment other than those of established practice.

“Research is being conducted along the following lines:

1.—The smelting of the heavy chalcopyrite ores and concentrates in a non-oxidizing atmosphere, using an alkali flux to slag off impurities, and producing a low-grade matte containing all the metals, such as copper, iron, and precious metals, and also the sulphur content of the ores; the roasting and chloridizing of the matte in weak acid solution, leaving an iron oxide residue for conversion into iron and steel products; the electrolysis of the leached solutions for the recovery of the copper and precious metal values.

“Such a method applied to the Horne ores would permit of smelting operations at the mine without any serious damage to vegetation in the immediate vicinity, as all the sulphur content of the ores goes into the matte. As the property is situated in the clay belt, in a good agricultural district, at present covered with uncut pulpwood, smelting operations in which the sulphur is allowed to escape into the atmosphere would be the cause of considerable damage to the surrounding country, and worry to any operating company. The low grade matte could be shipped to a point where little vegetation exists and where cheap electric power could be made available, with the possibility of utilizing at least some of the sulphur content for industrial purposes. The iron content and also the copper and precious metal values could be recovered. It is upon processes of this nature that the greatest economical development of our mineral resources will ultimately depend.

“2.—An investigation is being made of the cyanidation of cupriferous gold ores, in which the copper content will not permit of the economic recovery of the copper values. Research is being conducted on such ores carrying copper values up to two per cent copper, by cyaniding the ores in the regular manner, and then precipitating the dissolved gold and copper values, with the regeneration of the cyanide. If a process of this nature could be worked out and demonstrated to be commercially feasible, it would have a wide application in the treatment of cupriferous gold ores, including many of the ores of northwestern Quebec.

“3.—The concentration and cyanidation of cupriferous gold ores: Experimental work is being conducted on the concentration by selective flotation of the chalcopyrite and the cyanidation of the flotation tailings. This process depends on the establishment of a smelting industry in the district where the copper concentrate could be sold at a profit.” (*)

MOLYBDENITE

Owing to the large stocks of molybdenite which had accumulated during the last year of the war and the following year, the production of this mineral was practically at a standstill for four

(*) The Canadian Mining Journal, Feb. 20th, 1925.

years. This was notwithstanding a steady development of the use of molybdenum steel in the peace industries, for this is yearly assuming a growing importance in the manufacture of special parts in the construction of automobiles, air craft, and other machines, but for the last five years the stocks were more than sufficient to meet the demand.

In Canada, 1924 saw the resumption of molybdenite mining, and in the province of Quebec there was a small production of 13,239 lb. valued at \$6,606.

The *Canadian Wood Molybdenite Co.*, of Quyon, acquired the Moss Mine, located on lot 9, range VII of Onslow township, distant thirty miles from Hull on the Ottawa river above the city of Ottawa. The mine itself was operated during the greater part of the year. The concentrating mill, after being repaired and overhauled, was started on July 16th and operated for nearly three months. It then closed down for the purpose of remodelling. The Canadian Wood Molybdenite Company is the only operator who reported having made shipments.

The *Molybdenite Reduction Company, Ltd.*, who owns a very promising deposit on lots 1 and 2, range I of La Corne township, and the *St. Maurice Mines Ltd.*, who have a molybdenite mine and a mill on the Indian peninsula of Kewagama lake in Preissac township, report as not having resumed operations yet.

“Large quantities of molybdenum at steel mills have retarded the resumption of mining operations. The use of molybdenum in steel is now on a very healthy and sane basis. It has passed through a severe competitive period. The comparative merits of molybdenum in steel have been thoroughly tested and approved. The increase in tonnage consumption of molybdenum steel, and of consumers of molybdenum steel during 1923, was especially noteworthy in the United States.

“From the technical standpoint the most important properties of molybdenum in steel are its forging ability, machining ability, hardening ability, heat-treatment advantages, resistance to wear and the uniformity and high physical merits of the steel in laboratory and service tests. The physical merit of molybdenum steel holds for any combination with other alloying elements used in

steel, and the economies are particularly favoured by the small amount of molybdenum required to produce the necessary results. The major tonnage of molybdenum steels used to-day contains less than one quarter of one per cent molybdenum. (*)”

LEAD AND ZINC

During the year 1924 there was a quantity of 34,000 tons of lead and zinc ore mined and milled in the province of Quebec, from which there was produced and shipped 3,494 tons of zinc concentrate containing 3,488,560 lb. of metallic zinc, and 1,269 tons of lead concentrate, containing 1,036,648 lb. of metallic lead, the total value of the two concentrates being reported as \$146,935. This value is for the metals zinc and lead only, the contents of the ore in precious metals, gold and silver, being entered under their respective headings.

Market conditions for lead and zinc ores improved greatly in the course of 1924. The price of metallic zinc rose from 6.37c. per lb. in the first week of 1924, to 7.85c. in the first week of 1925. The price of lead from 7.80c. to 10c. in the same period.

The *Pierre Tétrault Estate*, who controls the lead and zinc mines in Montauban township, in Portneuf county, carried on mining and concentrating at Montauban-les-Mines, near Notre-Dame-des-Anges. The milling of these ores at the Tétrault mine during the year was restricted, to a great extent, to table separation of the lead ore from the zinc, the lead concentrate being shipped while the zinc blende, which was mainly collected in the middling, was piled awaiting the installation of an oil flotation plant to concentrate it from about 18% zinc to the required 50 to 60%.

The *British Metals Corporation (Canada) Ltd.*, entered the Montauban field, by acquiring the large heap of zinc ore which had been left at the zinc oxide plant, at Notre-Dame-des-Anges station by the Zinc Company of Canada, after the destruction of the oxide plant by fire in 1922. This heap was calculated to contain some

* The Mineral Industry during 1923. G. A. Roush, editor. McGraw-Hill Book Co., New York.

12,000 tons of 25% zinc ore. A small, but very efficient oil flotation plant to treat these "middlings" was erected. The plant produced 50 to 55% zinc concentrate and 25 to 30% lead concentrate, the results being very satisfactory. Towards the end of the year the British Metals Corporation were in negotiation to lease the mine at Montauban-les-Mines from the Tétrault Estate.

The *Federal Zinc and Lead Co. Ltd.*, who owns promising deposits in Lemieux township in Gaspé county, did not do any mining or exploration work on their property, but concentrated all their efforts on the completion of the road, some fifty miles long, to connect the mine with the railroad.

TITANIFEROUS IRON ORE

A small production of titaniferous iron ore was recorded in 1924, amounting to 1,408 tons valued at \$3,771. This was mined by the Baie St. Paul Titanic Iron Ore Co., from what is locally known as the "Glen" mine, situated on lot No. 312 (cadastral) St. Urbain range, one of the deposits of the Baie St. Paul region, sixty miles north-east of Quebec city. As in the past this ore was shipped as a source of titanium to the Titanium Alloys Company of Niagara Fall, N. Y., for the manufacture of ferro-titanium.

The market for the titaniferous ores of the Province of Quebec, is limited and irregular. In our reports for 1921 and 1922 we drew the attention to the fact that titanium ores were being used, both in Europe and in the United States, in the manufacture of Titanium White, or titanium hydrate, a white pigment which is reported to possess many advantages over white lead. (*) Hope was expressed that the manufacture of titanium white might partly solve the problem of the utilization of some of our large deposits of ilmenite ores of the North Shore. It is possible that the large development of hydraulic power which is now proceeding in the upper Saguenay region, and the ensuing cheap power available, may greatly foster the development of the mineral resources of the region, by the establishment of manufacturing industries using mineral substances. The advantages of titanium white over other white pigments, are its great whiteness; inertness to acid fumes, sea-water, and light;

* See Mining Operations in Province of Quebec for 1921, and for 1922.

non-poisonous qualities; great opacity and covering power. The main drawback is the cost of manufacture.

Mr. H. Leverin, of the Federal Department of Mines, investigated the manufacture of titanium pigments in the United States in 1924, and the following notes have been abstracted from his observations which he kindly communicated to us in manuscript form.

“Three types of pigment products are being manufactured, namely Pigment A, consisting essentially of pure titanitic oxide, and pigments B and C, in which titanitic oxide is precipitated on, or with, a base or “extender” pigment.

“The main drawback to pigment “A” or pure titanitic oxide is the high cost of manufacture. From the industrial and commercial standpoint, pigments of the “B” and “C” types, or composite pigments, are of greater importance. It is claimed that a titanium pigment containing about 35% titanitic oxide is fully equal in hiding power, to pure titanitic oxide, in which case there would be no advantage in producing a pigment of a higher titanium content. The “B” type is a mixture of titanitic acid (25%) and barium sulphate (75%), handled in the trade under the name of Titanox. The “C” type is a lime-titanium pigment containing titanitic oxide (28 to 35%) and calcium sulphate (72 to 65%).”

Another means of utilizing some of these ilmenites is suggested by the following notes:—

A POSSIBLE NEW USE FOR TITANIFEROUS IRON ORE. (*)

“During the last six months of 1924, there appeared in the technical press a series of articles, by one of the best known authorities on cements in America, describing a series of newly discovered cements of great potential value. These new cements called Titan cements—are quick-hardening, high strength cements, having a lime base, like Portland and alumina cements, but differing from them in having as their chief acid constituent titania (TiO_2) instead of silica or alumina. They are said to be more uniform in composition, denser, and chemically more resistant (and hence probably more durable) than any cement heretofore produced.

* Prepared by A. H. A. Robinson, Mines Branch, Department of Mines, Ottawa.

They are made by fusing a mixture of titaniferous iron ore, limestone, and coke, in either an electric furnace or a blast furnace, the products being pig iron (a by-product) and a slag, that, when finely ground constitutes Titan Cement.

“Commercial success for these new cements will depend largely on ability to manufacture them at a cost not materially greater than that of the Portland and alumina cements with which they will compete. And this in turn calls for a happy combination of cheap and abundant raw material, cheap power, and ready access to markets—conditions that will confine their production to certain favourable localities. In this connection they become of special interest in Canada. There are several points in eastern Canada where Titan cements might possibly be made at a profit, but the most striking advantages are those afforded by the Saguenay district in Quebec, where, within a radius of a few miles, are to be found large bodies of highly titaniferous magnetite, limestones, and one of the largest developments of cheap hydro-electric power in America. Through the port of Chicoutimi, close at hand, at the head of navigation on the Saguenay river, sea-borne coal or coke could be brought in, and the same port or the railway facilities with which the district is provided, would afford a ready outlet to domestic and foreign markets.”

In the course of an examination of the western extremity of the large development of anorthosite in the lake St. John region, Mr. Bertrand T. Denis spent some time in Bourget township, looking into the geology and mode of occurrence of the titaniferous magnetite deposits of that township, and supplies the following notes.

NOTE ON THE TITANIFEROUS IRON ORE IN THE LAKE ST. JOHN
REGION (*)

“In the course of an examination of the western end of the large elongated anorthosite massif which runs north-east from Lake St. John, 125 miles north of the city of Quebec, a short time was spent on the titaniferous iron ore deposits which are connected with it.

* Prepared by Bertrand T. Denis, Quebec.

"The massif itself is an immense intrusion of igneous rock, varying in composition from pure anorthosite, to a gabbro containing up to 50% of pyroxene and other ferro-magnesian constituents. The study of the thin sections of the rocks collected in the field is not yet completed, but it may be stated that the anorthosite appears to be composed of plagioclase feldspar corresponding to approximately $Ab_{50}An_{50}$. In this anorthosite occur bands, or belts, of gneissic gabbro. To this massif is assigned a precambrian age.

"The titaniferous iron ore is disseminated almost everywhere throughout this rock, and a close examination of the outcrops almost always discloses the presence of a few grains of it, or even of segregations of all sizes, up to several feet in diameter. As a rule the ore is disseminated irregularly in lenses, but in some cases deposits affect dyke-like forms.

"Although the titaniferous iron is of very wide occurrence, so far only one deposit has been observed of sufficient volume to be of economic interest. It is a deposit which was described by P. E. Dulieux in his report on "The Iron Ores of the Province of Quebec", published in 1915, by the Quebec Bureau of Mines.

"This occurrence, known as St. Charles mine, is situated on lots 44 and 45, range I, of Bourget township, Chicoutimi county, distant about $1\frac{1}{2}$ miles from the church of St. Charles village. The best road to reach it is from Jonquière, a station on the Quebec-Lake St. John branch of the Canadian National Railways. From Jonquière to St. Charles, a distance of 18 miles, there is a fair road, which is passable with automobiles during the greater part of the summer. Another way to reach St. Charles is from Hébertville, on the Canadian National Railways, by St. Joseph d'Alma, but this road is six miles longer and not as good as the road from Jonquière.

"The deposit described by Dulieux outcrops a few hundred feet from the river Saguenay, on lot 44, and is located on a small elevation of the ground. There are several exposures of ore, very distinctly apparent, and a little work has been done at one place. Mr. Dulieux arrived at an estimate of the volume of the ore in the deposit, from measurements and observations of the outcrops. He gives a quantity of 1,00,000 tons of probable ore, and of 5,000,000

tons of possible ore, admitting that some of the outcrops belong to a continuous body. Since this examination, which was made in 1914, other important occurrences discovered to the north-west of the exposures observed in 1912, permit to considerably increase the figures arrived at by Mr. Dulieux, if not double or even treble them. This fact is mentioned in a report on "Titanium" by Mr. A. H. A. Robinson, published by the Mines Branch of the Federal Department of Mines in 1922.

"In the course of the field season of 1924, Mr. Robinson returned to St. Charles to make a more detailed magnetometric survey of the deposit. Although his report has not yet been published, Mr. Robertson kindly supplied me with a copy of the preliminary map plotted from his latest field-work.

"The map indicates that the ore is irregularly distributed over a surface measuring 2,200 feet by 1,500. The masses or lenses, although irregular in outline, affect a comparatively well marked north and south strike. This coincides with the strike of the country rock, which is here constituted by anorthosite and gneissic gabbro, the latter predominating. However, despite their being irregularly distributed, the individual lenses of ore are of workable size.

"Another fact which is plainly brought out by an examination of the map is that the ore is more resistant to abrasion and weathering than the country rock, and it therefore occupies the higher levels of the topographical reliefs. Dulieux had also noted this fact, which he mentions in his report.

The ore may be divided into two classes. On the one hand, a comparatively pure ore, fine grained, containing a few inclusions of the country rock; this is the typical ore of the part of the deposit described by Dulieux. On the other hand, in the northwestern part of the lot, two distinct kinds of ore are observed, one being coarse-grained and noticeably richer than the second which is fine-grained and impure. In the latter Mr. Robinson has observed the presence of apatite and sphene. In this part of the deposit much of the ore carries up to 50% of foreign matter in the form of anorthosite and of a black rock, compact and tough, fine-grained which appears to be intimately connected with the ore, sometimes forming

with it a contorted complex. This rock which at first sight appears to be a dyke rock, contains the following constituents: magnetite, in numerous small irregular grains, generally surrounded by a rim of brown hornblende, quite pleochroic; augite, pale brown, in larger grains than the hornblende, and more abundant; numerous small grains of olivine, which in contact with the plagioclase feldspars show zones of resorption composed of two bands sharply divided, the inner one made up of pyroxene, and the outer one of green hornblende. The fissures sometimes show an incipient alteration to serpentine (antigorite). The feldspars, which were determined by the Fedoroff methods, show the composition $Ab_{50}An_{50}$. The thin section which we examined held no apatite, but similar rocks from another part of the massif showed the presence of this mineral, and there is no doubt that this rock contains it. The thin section shows the rock to be holocrystalline and that the ophitic texture, characteristic of the diabases, is entirely absent.

“If, as we stated, this rock on first examination appears to be a dyke rock, on the other hand the complex which it constitutes with the ore would rather indicate it to be the result of segregation. This moreover is supported by the fact that by following the strike of the gneissic structure of the massif, outcrops are found where bands of this rock alternate with the enclosing gabbro. The width of these bands varies from a few inches to four feet. It may be added that abrupt variations of composition and grain are frequently observed in gabbros.

“Analyses effected on ore samples from this deposit gave the following results:—

	I	II	III	IV	V
Fe.....	50.53	50.50	52.10	48.18	33.77
Ti.....	10.55	10.08	12.60	13.45	7.44
S.....	0.02	0.492	0.034	0.007	0.038
P.....	0.03	0.046	0.079	0.404	3.85
V_2O_5.....	.....	.....	0.10	0.36	0.36

I.—Dulieux. “Les mineraux de fer de la Province de Québec.”

II & III.—“Titanium”, by A. H. A. Robinson, Analyses by H. A. Leverin.

IV.—Pure Ore.

V.—Impure Ore.

} Unpublished information supplied by M. Robinson.

"It is to be noted that the determination of $V_2 O_5$ in samples IV and V, was rather unsatisfactory and could not be accepted without verification. Moreover the proportion of phosphorus is rather disquieting, and much higher than in any previous analysis made on ore from this occurrence. It is much higher than it might be expected in ores of this kind.

"The present commercial value of the deposit and the possibility of its exploitation in a near future are points which present uncertainties. In spite of their irregularity of distribution the individual ore masses are sufficiently large to be workable, and the impure ore could easily be concentrated before smelting. In Memoir No. 92 of the Geological Survey of Canada, published by the Department of Mines, Ottawa, in 1916, Dr. Alfred Stansfield of McGill University gave an outline of the possibility of treating this ore by electric furnace.

"The development of the Grande Décharge Falls, on the Saguenay river at the outlet of Lake St. John, and the construction of a large hydroelectric power plant at that place, will soon insure electric power to the region at very reasonable rates. But on the other hand, while excellent iron and steel products are made by electric furnaces, the cost prices are high. So that the financial success of mining the St. Charles ore would depend on an assured market for iron and steel products of high grade, but at high prices.

"There is also a possibility of manufacturing "titanium white", a white pigment which offers certain decided advantages over the lead and zinc pigments at present used.

"In closing these notes I wish to put on record my indebtedness to Mr. A. H. Robinson, of the Federal Mines Branch, for the help and advice which he kindly extended to me both in the field and afterwards."

MAGNESITE

Shipments of magnesite amounted to 2,250 tons of dead-burned and 1,536 tons of calcined, in all 3,786 tons valued at \$101,122. The quantity of crude magnesite rock which this represents is 7,952 tons.

Returns were received from three operators, the *International Magnesite Co.*, with quarry and kiln on lot 13, Range I, of Harrington township, the *North-American Magnesite Producers Ltd.* on lot 15, range IX, Grenville township, and the *Scottish Canadian Magnesite Co.* on lot 15, range XI.

The two last companies operate jointly since 1922. During the year 1924 most of the crude magnesite was quarried on the North American property and sintered in the Scottish-Canadian plant. The quarry is one mile from the sintering plant, but less than half a mile from the narrow gauge railroad, 13 miles long, which connects the Scottish Canadian plant with the C. P. R. at the station of Magnesite.

After the two companies had made an arrangement for their joint operations in 1922, a short railway spur was built from the narrow gauge railroad to the North-American quarry, so that all these points are now connected by rail.

From the quarry of the North American Magnesite Products Co. the crude magnesite is transported by the railroad to the sintering plant. It is first crushed, to three or four inch size, in a No. 6 Kennedy gyratory. Then, by a belt conveyor, it goes to a Gates gyratory No. 4. Along the belt conveyor three or four men discard the pieces which are high in lime, or in silica, or in serpentine. From the Gates crusher it goes to a Krupp ball mill, to be reduced to $\frac{1}{4}$ inch maximum, then to three tube mills, where it is ground so that 40 to 50% goes through 100 mesh screen. The pulverized magnesite is then conveyed to the three sintering rotary kilns which are fired with powdered coal. The sintering temperature is 2800° Fahrenheit. Iron mill-scales is added to the magnesite in the kiln, to give the necessary bonding qualities. The dead-burned magnesite is shipped to the British Empire Steel Works, at Sydney; to the Steel Company of Canada, at Hamilton; to the Algoma Steel Company at Sault-Ste-Marie. Small shipments have also been effected to the United States, but the American market is practically closed owing to the prohibitive duty imposed by the U. S. Tariff of 1922, which is \$11.50 a ton. Some trial shipments have also been made to England, and the Canadian producers hope to eventually develop an overseas market and supply dead-burned magnesite to the steel works of the British Isles.

The quality of the material leaves nothing to be desired, and Quebec dead-burned magnesite gives satisfaction in all the steel works where it is used. An unsolicited and unbiased testimony to this excellence came out in the course of the sessions on Refractories at the meeting of the American Ceramic Society, at Columbus, Ohio, in February, 1925. In a compte rendu of the discussion, the following paragraph was observed:

"The subject of furnace bottoms was dwelt on briefly by the last speaker, William J. McCaughey, professor of mineralogy, Ohio State University, whose subject was "Microscopic Examination of an Open-Hearth Steel Bottom." He said that up to the war, magnesite open-hearth steel bottoms had been generally used, but as Austrian magnesite was no longer available, American iron-free magnesite came into use and this was generally successful in open-hearth bottoms, but not so satisfactory in brick making. He referred to an unusually good furnace bottom made of Canadian magnesite used in one of the open-hearth furnaces of the Donner Steel Co. After 200 heats had been taken there was not a hole in the bottom. He secured a piece from this bottom for a chemical and microscopic examination and found that the composition had changed, the 16 per cent of lime having been reduced to four per cent and the silica having dropped to two per cent. The material had recrystallized and had formed a monolithic bottom." (*)

GRAPHITE

Small shipments of graphite were effected in 1924, by three producers. These shipments totalled 90,429 lb. valued at \$3,264.

The *North American Graphite Co.*, which was reorganized late in 1923, with Mr. H. P. H. Brumell as general manager, entirely remodelled the mill and put the mine in shape. Both mine and mill are on lot 28, range VI of Buckingham township.

The deposit consists of a band of crystalline limestone, very graphitic, near an intrusion of basic rock, coarse-grained, of gabbro type. The ore contains up to 18% of graphite.

* The Iron Age, February 26th 1925, page 614.

The mill, as remodelled, comprises a Blake crusher, 9 x 15; a gyratory No. 3; a Hardinge ball-mill 6' x 48". Oil is added in the Hardinge mill. The ore then goes to three Diester Conc classifiers, two New Type Callow Rougher cells (long shallow cells of 8 units, 24 feet long). The concentrates are then pumped up to three revolving screens. The fines go to a Callow Cleaner cell, and the coarse to two Diester tables. The concentrates from the cleaner and from the tables go to settling tanks for dewatering and thence to a cylindrical dryer, heated by oil. The product at this stage is 60% of graphite carbon. It then goes to the finishing mill, which is of the ordinary type. The finished product is said to assay 93% carbon. The mill ran for several weeks in August and September.

The *Canadian Graphite Corporation*, who have leased the property of the Standard Graphite Company, at Guénette, lots 27 to 30, ranges VI and VII, Boyer township, did not operate the mine nor the mill during 1924, but shipped from stocks on hand.

The *Quebec Graphite Co. Ltd.*, (in liquidation) did not operate in 1924, and made some small shipments from stocks on hand.

FELDSPAR

Shipments of feldspar in 1924 amounted to 16,222 tons valued at \$143,076, as compared with 12,026 tons valued at \$97,591 in the previous year. This is an increase of 35% in quantity and of 47% in value.

Returns of shipments were received from eight operators, as follows, in order of the importance of the quantity shipped: O'Brien & Fowler; St. Lawrence Feldspar Co.; Bush Winning; Laurentian Feldspar Co.; Canadian Amber Mica Co.; Emmanuel Lapointe; J. J. & Wm. Cameron; Louis Couture.

The feldspar industry in Quebec is developing steadily and has made great progress in the course of the last five years. Previous to 1919 the production was irregular and desultory. But the development of the potash feldspar deposits of the Buckingham district, and the careful sorting and cleaning before marketing practised by some of the important operators in recent years, have drawn the attention of feldspar consumers to the Quebec feldspar, which now enjoys an enviable reputation and commands high prices.

The following table of production shows the progress of the feldspar production in the last decade.

Production of feldspar in Province of Quebec

YEAR	TONS	VALUE
1914.....	98.....	\$ 2,156
1915.....	32.....	640
1916.....	4,606.....	20,760
1917.....	1,195.....	8,225
1918.....	191.....	4,357
1919.....	925.....	11,665
1920.....	849.....	11,252
1921.....	9,797.....	79,752
1922.....	12,472.....	115,483
1923.....	12,026.....	97,591
1924.....	16,222.....	143,076

It has been frequently mentioned that almost the whole of the part of the Province of Quebec situated north of the Ottawa and St. Lawrence rivers, is underlain by rocks of Precambrian age, the vast majority of which are of a granitic nature. In many places these rocks outcrop as dykes of pegmatite, offering resources of feldspar the extent of which probably cannot be duplicated anywhere in the world. Of course as feldspar is a comparatively low priced product, only the deposits most favourably situated near a railroad or within easy reach of water transportation can be worked at present.

The valley of the Lièvre river, a tributary of the Ottawa river is the main feldspar producing district of the Province of Quebec, and the town of Buckingham is the principal shipping center. The feldspar of this district is high in potash, carload lots running as high as 13 ½ per cent potash; 1 to 1 ½ soda; 4 to 5 per cent free silica. Some of the deposits yield a pure orthoclase, from colorless to white, which is used in the manufacture of artificial teeth and is designated as "dental spar." The dental spar brings much higher prices than the feldspar used in the ceramic arts, but its market is limited.

Very large deposits of potash feldspar occur in various places on the north shore of the gulf of the St. Lawrence, and an important deposit is being worked at Quatechou-Manicouagan Bay, some 500 miles below the city of Quebec. The district was last year the object of a geological investigation for the Quebec Bureau of Mines by Mr. Erlenborn, of McGill University, whose report follows immediately.

REPORT ON THE FELDSPAR DEPOSITS OF QUETACHOU-MANICOUAGAN BAY, QUE.

by W. Erlenborn, M. Sc. ()*

INTRODUCTION

The following report covers the work done by the author on the pegmatite dykes adjacent to Quetachou Manicouagan Bay in Saguenay County, Quebec, during the summer of 1924.

The area takes in a strip of land parallel to the north shore of the Gulf of St. Lawrence for a depth of from 3 to 5 miles and a width of 9 miles, Quetachou Bay approximately separating the western one-third from the eastern portion.

Quetachou Bay is locally known as the "Big Bay" and will be referred to by that term throughout this report.

Very little work, having in view the economic possibilities of feldspar, has been done on the area. Some years ago Mr. H. S. de Schmidt spent part of one day at the property and the result of his observations are recorded in Mines Branch Bulletin No. 401 on Feldspar in Canada.

GENERAL GEOLOGY

The area in question is part of an enormous exposure of granite, which forms the north shore of the Gulf of St. Lawrence westward as far as Tête-de-Perdrix, approximately where the 63° western longitude intersects the shore. Here it disappears beneath a black, nonfossiliferous limestone, striking east and west, with a very slight dip to the south.

* Lecturer in Mining Engineering, McGill University, Montreal.

Towards the east the granite was followed as far as Natashquan, a total distance of 73 miles. It is not possible to ascertain how much further the exposure continues, without going to disproportionate expenses.

The granitic batholith has been laid bare by the erosion of the intruded strata, of which only very few remnants are preserved in the form of roof curtains and partially absorbed stringers, changing locally both the texture and color of the typical granite.

The only exposure of these intruded strata of sufficient size to preserve at least part of their original characteristics, occurs on both the east and west side of Quetachou Bay. A strip of Grenville sediments 7 miles wide lies here in a trough-like depression of the granite, and is structurally the remnant of a large synclinal fold, of which both limbs have been eroded away.

Intruded into these sediments is a large mass of diorite, which forms a continuous outcrop on the west and south-east shore of Lac Veronic, disappearing towards the east under a large swamp, through which the little Watshishou river meanders its way to the shore of the Gulf. Contacts between granite and sediments against the dioritic material could not be found on account of swamps. But considering that the diorite is fresh and not affected by folding, and that no trace of pegmatitic intrusions could be found, it is evident that it must be later than both sediments and the granitic intrusion.

Pegmatitic material begins to make its appearance as far as two miles west of Piashtibaie, outside of the area under consideration. When confined to the granite proper, the pegmatite does not form true dykes, only local splashes and discontinuous stringers of a prominent red color. But as soon as the stringers have penetrated the sediments, a distinct change takes place. The most notable one is the change of colour of the predominant feldspar from red to white or greenish white, although locally pink to reddish splashes still persist.

Also the dykes are much more continuous where they have penetrated the sediments, in fact they gain their greatest development in all three dimensions directly adjacent to the Big Bay, but diminish gradually in importance as the eastern contact is approach-

ed. From about one mile and a half east and west of the axis of the Big Bay, the proportions of the pegmatites get so small, that they are of no commercial importance.

The strike of the dykes has evidently been determined by that of the sediments, N. 45-50 E. but their attitude usually only coincides with the latter where the pegmatite stringers are comparatively narrow. In some cases "lit par lit" injection has taken place, bands of pegmatite and sediments alternating in perfect order. But when the dykes gain dimensions of economic importance, cross cutting generally takes place, but only as far as dip is concerned. Of course there are many minute stringers, generally very narrow, which have forced their way through the strata in a most intricate manner, appearing as scrolls and curves on eroded surfaces and cliffs.

No pegmatitic material similar to that of the western zone already described has been observed in the granite east of the area. Also the granite itself is coarser grained and the gneissic banding is not so regular.

On the other hand the eastern contact between the Grenville formation and the granite is accompanied by the introduction of a great number of quartz veins. Their spacing gets closer on approaching the contact from the east, until they merge to form the Esquimault Hills, a low ridge of beautiful, milky white quartz, striking N. 50° E. and terminating towards the south-west in the peninsula which contains Watshishou Hill. These quartz stringers have a strong influence on the granite, the grain of the latter becoming finer as the number of stringers increases, until it only forms pink splashes in the predominant white quartz.

Claim No. 5,234 is staked on the most southerly portion of this quartz zone and it would be interesting to know what it was staked for, because locally Watshishou Hill is referred to as a "Mountain of Spar".

The direction and attitude of the joint planes and cooling cracks in the granite vary from place to place, but they are all vertical or nearly so as far as observed. Of especial interest is a particular set which appears in one of the bays about three-quarters of a mile west of Piashtibaie. These joints strike persistently S. 23°E.

The most prominent one is 4 inches across and filled with calcite and fluorite. The walls show perfect crystals of quartz over which the other minerals were deposited, filling the vein together with a few specks of chalcopyrite.

This was interesting, because rumors are current that larger deposits of both fluorite and chalcopyrite, especially of the former, exist somewhere close by, but this could not be verified.

There is one other observation, which however is of scientific interest only. The joint planes in the pegmatite itself stand open in many places, but on Concession No. 65 several of these fissures seemed to be filled by inwashed sandy material. Fortunately one of these was laid open by the quarrying operations and revealed the fact that they were narrow sandstone dykes, a phenomenon which is usually found only in areas affected by seismic disturbances.

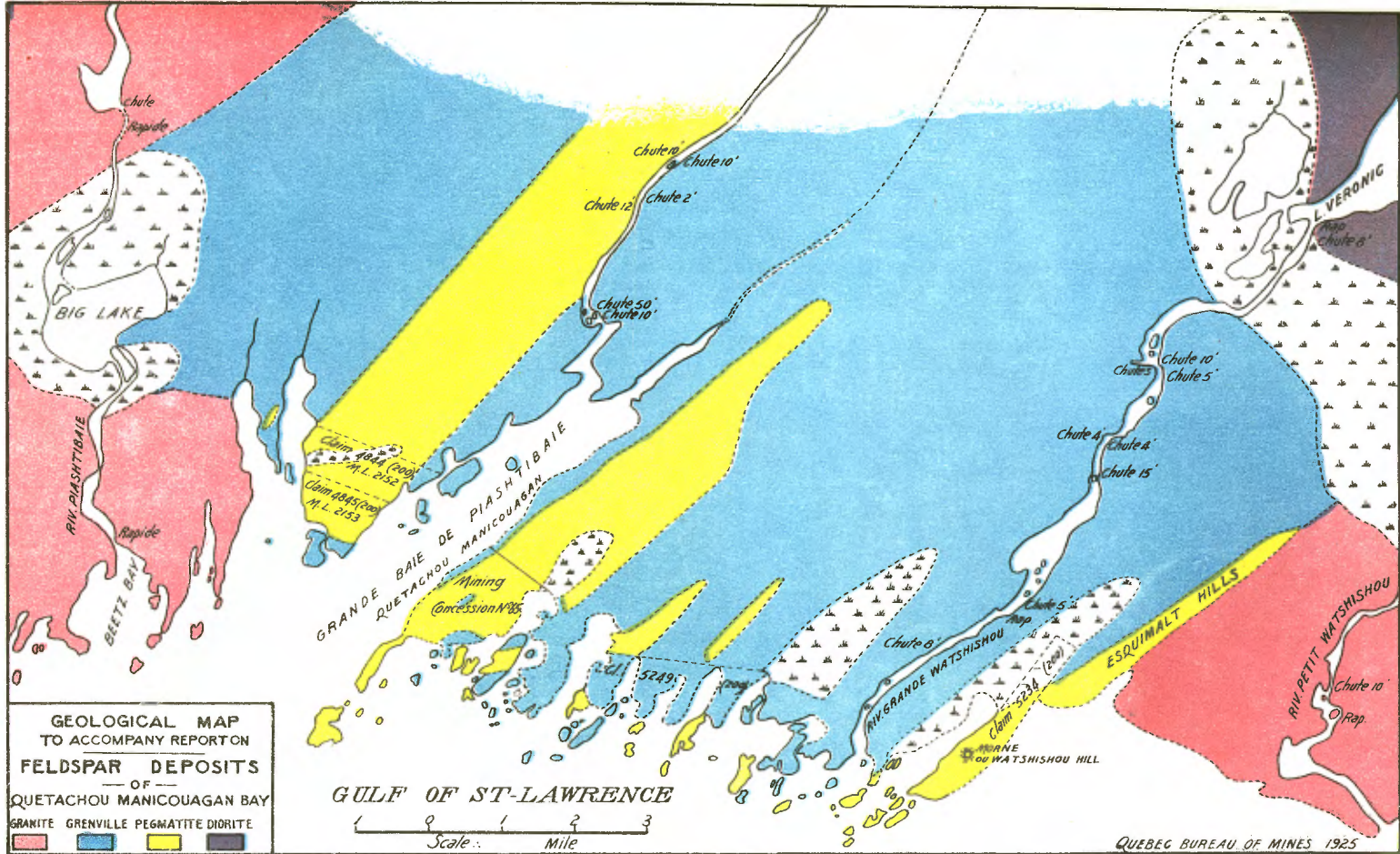
ROCKTYPES

Granite.—As previously mentioned, the granites cropping out east and west of the Grenville zone show some diversity of structure. This may be due to the fact that the western zone is slightly more acid.

The western granite is essentially a biotite granite. The feldspar is dominantly microcline, with subsidiary amounts of plagioclase, the latter usually in large fresh plates. The only ferromagnesian mineral, biotite, has been much altered, going over into chlorite. Muscovite is present only in very small amounts. Accessory minerals, such as apatite and zircon, are comparatively rare.

The distinction from the eastern granite is mainly structural, the gneissic banding in the latter being much coarser and more irregular. Also a green hornblende, which as far as observed is absent in the western zone, forms crystals up to a quarter of an inch in diameter, but is so evenly distributed, that some sections do not show it at all.

Pegmatites.—This pegmatitic material is described below in detail in connection with its areal distribution.



QUEBEC BUREAU OF MINES 1925



Johan Beetz Bay (Piashtibaie).—Post-office and steamer call.



St. Lawrence Feldspar Co.—Wharf on concession No. 65, blacksmith shop and stock piles.



St. Lawrence Feldspar Co. Ltd.—Upper quarry, showing entrance to quarry and stock pile.

Grenville.—The Grenville rocks offer a diversity of types ranging from masses of schisted amphibolites, through thin beds of similar material to fine-grained, highly metamorphosed sandstones.

Several thin beds of coarsely crystalline limestone, none of them over two feet thick, were observed in a small restricted area west of the Big Bay. On the weathered outcrops this rock type usually shows a hackly surface due to the weathering out of the calcareous matrix, the greenish black accessory minerals standing up in ragged bunches. Under the microscope the latter proved to be actinolite and diopside. Remnants of feldspar and quartz are also present, which would go to show that the present impure limestone is the altered equivalent of a highly calcareous sandstone.

Fine to medium grained gneisses, together with granulites, make up the main bulk of the lighter coloured rocks. Pure sandstones or their altered equivalents, quartzites with only a small proportion of ferro-magnesian minerals, are comparatively rare. Usually feldspars account for more than one-half of the volume of the colorless minerals. Orthoclase appears to have been the original feldspar constituent. Under the microscope it shows all stages of alteration, but is never very fresh. The plagioclases are typically absent. Microcline however is very plentiful and always fresh and unaltered. As this mineral is the dominant feldspar in both the granite and the pegmatite, which surround and intrude the sediments, there seems to be some genetic relation between the former and the widespread secondary development of microcline in the latter. Evidently the solutions from the cooling magma below, coming up along the limbs of the syncline, are responsible for this alteration which has been of the nature of more or less complete magmatic replacements. In fact this replacement of the original constituents of the sediments by microcline has so nearly gone to completion in certain favourable beds, that without considering field relations, it is almost impossible to distinguish them from igneous rocks under the microscope. These are the typical granulites mentioned above.

The gneissic banding is produced by very thin and finely laminated layers of mica and hornblende. Magnetite is present

in varying amounts and, together with its alteration products sphene and leucoxene, is one of the most persistent minerals in all rock types.

With the increase of hornblende and varying amounts of biotite, these gneisses and granulites grade over into amphibolites. This rock type has two typical modes of occurrence. On Concession No. 65 and at the mouth of the Big Watshishou River schisted amphibolite occurs in big masses, the schistosity being identical in strike and dip with the attitude of the other sediments. But when followed inland along the strike, it is found to change over into regular banded gneisses. Unfortunately no contact along the strike could be found between the two rock types. Therefore the possibility of this kind of amphibolite representing a basic igneous intrusion into the regular Grenville sediments could not be settled.

On the other hand, there are numerous comparatively narrow beds of amphibolite, which lie conformable with the regular bedding of the Grenville sediments. They are usually found to grade over in both directions into the lighter colored rocks with which they are associated.

PHYSIOGRAPHY AND STRUCTURE

Wherever the sediments are prominent, their strike N. 45-50°E. dominates the physical features of the area. This is particularly evident in comparing the character of the coast where granite on the one hand and the sediments on the other have formed the shore line.

In traversing the sediments from the western contact towards the east, their dip changes from 45-50° S.E. to vertical and then reverses to about 50° N.W. at the extreme eastern end. The whole mass seems to be the remnant of a syncline, with its axis parallel to the strike of the sediments and approximately coinciding with the axis of the Big Bay, and with the thickest portion of the sediments therefore adjacent to the latter.

The rivers also within the area in which the sediments predominate, of which the two flowing into the head of the Big Bay as well as the Big Watshishou River, are the most important, adjust themselves to the north-east direction. The falls and rapids em-

phasize this fact in that the rivers are forced by some obstacle to forsake their straight course and turn nearly at right angles to make their way across the steeply dipping sediments.

Glaciation has had the most important influence in producing the existing surface features. But erosion has left a much more marked impression on the sediments than on the granite. This is due to the fact that the sedimentation planes are planes of weakness. They stand more or less vertical, and wherever they are strongly marked, they are often cut by cross fractures. Taking advantage of this, erosion has been able to get a better foothold, so that now the ridges of sediments fall off towards the water in little terraces with jagged edges, whereas the granite, due to its greater homogeneity, has preserved its glaciated surfaces and disappears into the Gulf in flat, smooth curves.

The pegmatites evidently offer greater obstacles than any of the other rock types to the erosion by ice action, and as the big masses are concentrated on both sides of the Big Bay, the general elevation of the area rises slightly both from east and west towards the region around the Big Bay, except near the eastern contact, where the hardness of the quartz ridge has had a similar effect. In fact Watshishou Hill on the extreme southern end of the ridge is the highest point in the area with an elevation of about 175 feet.

PEGMATITES

For about a mile and a half east and west outwards from the axis of the Big Bay the dimensions of the dykes are too small to be of any commercial value. But within this area there are two strips, each approximately one mile wide, adjacent and parallel to the direction of the Big Bay containing the main masses of pegmatite, which promise well and are worth prospecting.

The attitude of these big masses of pegmatite is difficult to determine, due to the fact that the general elevation of the area is very low, the average being not more than 50 feet. Denudation in general and glaciation in particular have had little effect on the pegmatitic material, so that now the larger masses stand out as hills, mostly elongated in the dominant strike of the sediments. The lower areas are usually swamp, bush or moss covered, the latter

particularly forming a heavy blanket on any flat space on which trees cannot exist.

Many of the pegmatite ridges are well rounded and taper off gradually both east and west, but wherever cliffs have developed, they are generally more pronounced along the north-western wall, the south-eastern slope disappearing usually under moss and bush successively without showing any change in composition.

At the bases of several cliffs it was observed that the pegmatitic material terminated abruptly, curving back towards the interior, leaving long cave-like openings, into which a man can crawl for varying distances. The back is smooth, coarsely crystalline pegmatite, whereas the floor shows the serrated edges of the vertical sediments. The opening pinches out towards the interior until both back and floor meet. This raises the possibility of some of the big pegmatites being remnants carved out of a nearly horizontal dyke. Similar phenomena were observed in four different localities.

In studying the eastern shore line of the second big bay east of Quetachou Bay, it was found that the pegmatite, which apparently made up the whole of the peninsula, was only a comparatively thin veneer. The pegmatite is resting here with a perfectly smooth surface, striking N. 50° E. and dipping very slightly to the south-east, on vertical sediments underneath. This is borne out by viewing closely the southern extremity of this peninsula at low tide. Here it can be seen how two small dykes come up through the sediments on the south-east side and seem to form the root of the blanket-like mass of pegmatite above.

Within 50 feet east of the southern tip of the peninsula there rise out of the water several small islands, composed of black amphibolite. If the pegmatite had been a dyke coming up from the south-east, these islands should have been pegmatite also, unless they represent a later igneous intrusion. This is disproved by the fact that these islands themselves show several small stringers of pegmatite, and therefore could not have been later.

Similar observations can be made on the western shore line of the Big Bay. The extreme south-eastern tip of the peninsula is made up of Grenville rocks, standing vertical, through which

several stringers of pegmatitic material have forced their way. The top of the peninsula however, is solid pegmatite. On the east shore of the peninsula splashes of sediments still cling to the cliff-like wall and about half a mile up this shore the pegmatite recedes from the water and is replaced by sediments. The latter are at a lower elevation and extend towards the north-west until they abut abruptly against the steep declivity formed by the pegmatite mass. The actual junction cannot be observed however, being covered by heavy bush and detritus. But again if the pegmatite had originally been a nearly horizontal dyke, dipping towards the south-east, the outlying islands and the whole western shore line of the Big Bay would have been pegmatitic material, which is not the case.

The one other obvious explanation is then than the big pegmatite dykes do not issue as such from the parent granite below, at least in this area, but as smaller stringers. These appear to join forces to form the larger masses.

MINERALS

The pegmatites are very lean in the rarer minerals which often accompany similar occurrences. They are comparatively simple mixtures of quartz and feldspar, the texture varying from very coarse to fine graphic intergrowths.

Feldspars.—Among the feldspars several varieties are present in quantity, and their colours range from pure milk white to dark red, but their composition as far as potash, soda and lime are concerned, is remarkably uniform.

Microcline is the dominant form in which this mineral occurs in the pegmatites in this area, but a sharp distinction can be drawn between the microcline in the deposits west and east of the Big Bay respectively.

The microcline in the western deposits is almost exclusively pure milky white, very dense and the cleavages are not well developed. This may have some connection with the fact that the feldspar is graphically intergrown with the quartz. But even locally where larger crystals occur, the same characteristics remain.

On the eastern side, however, microcline occurs in a wide range of colors. The white weathering variety never is milky white on fresh surfaces, but a yellowish creamy tinge predominates, with shades of a greenish hue of varying intensity. This grades through flesh colour and pink without any marked distinction into dark red perthite.

A pink orthoclase variety, without showing microcline twinning on the cleavage faces, has been found in quantity in one locality only on the western shore. But its potash content is almost identical with that of the microcline.

There remains only one other variety. This contains a high percentage of soda, as had been suspected by its albite-like bluish iridescence. No transition between this and the other feldspars has been observed. The colour varies from almost white to yellowish green and blue. The analysis and specific gravity determine it as oligoclase.

Samples of the typical feldspars were prepared and sent to Messrs. J. T. Donald & Co., Ltd., for analysis with the following results:

Sample:	1	2	3	4	5	6
Potash.....	10.41	10.79	10.49	1.16	10.91	10.60
Soda.....	3.86	3.85	3.54	9.67	3.80	3.85
Lime.....	0.36	0.18	0.28	1.52	0.22	0.22

- (1) Creamy white microcline, lower quarry, Concession No. 65.
- (2) Pink microcline, upper quarry, do do
- (3) Red perthite do do do do
- (4) Oligoclase, lower quarry, do do
- (5) White microcline, western zone.
- (6) Pink orthoclase, do do

Tourmaline.—This mineral occurs locally in comparatively large masses and is always black. It is known under the nickname "Labrador Coal". Crystals several inches in diameter have been observed, but the mineral is usually mixed with other material mostly quartz and soda-rich feldspars. Very fine graphic intergrowths of quartz and tourmaline have also been noticed.

Mica.—This mineral occurs in quantity both as the potash-rich variety, muscovite, and the black iron-rich biotite. Their areal distribution and other characters are best taken up in the general discussion of the big masses of pegmatite and under the section dealing with the economic aspects.

Garnet.—Garnet occurs plentifully and is one of the main deleterious minerals, and for that reason best taken up under the headings mentioned in connection with micas. It is uniformly of a reddish-brown colour, the size of the crystals varying from almost microscopic to as much as two inches in diameter.

A few simple tests carried out in the laboratory showed that the iron content is high enough for the mineral to be attracted by a strong electromagnet when reduced to one eighth-inch diameter and smaller. This fact may be of interest in connection with possible concentration methods to be applied to the large graphic deposits of the western zone, which are especially contaminated with garnets of various sizes.

Magnetite.—The black magnetic iron oxide magnetite has been found in a few places. This observation is of scientific interest only, because fortunately it has so far at least always been found associated with the coarser masses of quartz and the fine soda-rich mixtures, which would naturally be discarded in any feldspar-mining operation.

Molybdenite.—This is the only remaining mineral of any interest. It usually occurs as small, widely scattered flakes. However, a larger outcrop was observed near the contact of pegmatite and the amphibolite schist, which forms the country rock near the quarries which are being worked at present. Its distribution and quantity are of such a nature as to be neither harmful nor of economic importance.

DESCRIPTION OF THE DYKES

Western Zone.—There is one main distinguishing feature between the two parallel developments of pegmatite, west and east of the Big Bay, and that is that the predominant mica on the western side is a white mica, which occurs almost to the exclusion of the black iron-rich variety.

But unfortunately an iron-rich garnet is plentifully sprinkled through the mass. The St. Lawrence Feldspar Co., has done some work in three different places on their claims No. 4844-5, which are situated on this western belt and each one showed this peculiarity. The fine dissemination of this objectionable mineral precludes any idea of hand sorting. That does not mean of course that the pegmatitic material cannot be used, because owing to the size of the garnet crystals, which average about three-sixteenths of an inch in diameter, they will be freed in an early stage in crushing and could then be taken out by electromagnetic separation as mentioned above. The occurrence of these garnets is by no means local. In examining outcrops, garnets are seldom found on the surface, because they weather faster than any of the other constituents, but their negative casts are well preserved.

Another feature of this western zone is the enormous development of a pure white graphic granite, and it is in connection with this material that the garnet occurs so plentifully. In the peninsula on which claims No. 4844-5 are situated, three distinct ridges of pegmatite terminate. The most easterly is the most continuous in that there are no cross valleys and it can be traced in a north easterly direction up to the river which forms the big falls at the head of the Big Bay, with an average elevation of about 75 feet. Almost the whole of this mass shows graphic granite at the outcrops, with the peculiar pitted surface due to the weathering out of the garnets.

The graphic granite is an intergrowth of pure white microcline feldspar and quartz, with accessory and variable amounts of white mica, garnets and tourmaline. The texture of the whole is very uniform, very few outcrops showing any coarse development of individual feldspar crystals and quartz.

The most westerly of the ridges is identical in composition and texture, but is not so continuous, being cut by cross valleys both oblique and at right angles to the main trend.

The central ridge however, shows a radical departure from the two already described. Where it terminates against the small semicircular bay at the extreme southern end of the peninsula, there is a very good showing of a coarse-textured mass of pink

orthoclase, with crystals as much as 12 inches across, in a mixture of coarse quartz and very little white mica. No garnets at all were to be seen on this face.

The pink colour alone serves to distinguish this mass. This ridge also is not so continuous as the most easterly one, moreover the surface north-east, past the first big cross valley, is fairly heavily covered by moss and bush, so that detailed work could not be carried out. But it was picked up again in making a traverse from the head of the bay just west of these claims to the big falls at the head of the Big Bay. Unfortunately the St. Lawrence Feldspar Co. has not done any work on this material, so that an insight into the vertical arrangement could not be gained.

Eastern Zone.—The main distinguishing features of the eastern zone are the presence of a greater proportion of biotite in relation to the muscovite and a much greater variety of feldspars. Garnets are plentiful locally only and are not widely disseminated, but congregate mostly in bunches. Also the ridges are not so continuous as on the western side of the Big Bay.

Examination and detailed work outside of the area covered by Concession No. 65 is very difficult. This mining concession is situated on a peninsula and is exposed to the strong east winds which discourage the growth of most of the vegetation, so that now only the persistent mosses cover any large areas. But beyond this the timber makes its appearance and swamps are very plentiful, so that only the ridges themselves offer any chance of closer study.

In looking over Concession No. 65 it is at once apparent that the pegmatitic material did not come up as a series of definite dykes, but worked its way in an intricate manner through the country rock, which is here entirely a highly schistose amphibolite. The lighter coloured sediments do not appear until the northern boundary except along the shore. The pegmatites vary enormously in size; they split and join again, including large masses of the amphibolite. But the development is largest in the narrow peninsula at the extreme south-west and a strip about 500 feet wide along the eastern shore of the Big Bay until near the northern boundary of the concession, where the pegmatite predominates almost to the exclusion of everything else. From here on, com-

mence a series of ridges, from a few hundred feet to half a mile in length, which trend in the dominant north-easterly direction.

The colour of the pegmatite in the south-westerly peninsula is white, similar to the western shore, due to the presence of a white weathering greenish microcline. But local splashes of pink microcline occur, which grade over into a dark red perthitic feldspar. These local varieties do not only occur laterally, but also vertically. In one of the quarries this was well shown at the time of the writer's stay, one being able to observe the gradation taking place within the distance of a foot or even less.

The greenish white microcline with its pink variation, but not the dark red perthite, made up the main material which was being mined at the time. The pegmatite masses are very variable in texture and the microcline occurs in bunches as local segregations, crystals over two feet across being observed at favourable times.

The whole mass is then a mixture of various feldspars, ranging from microcline through perthite to the soda-rich varieties, with quartz, black mica, black tourmaline and garnet. The proportions of the several constituents vary with the texture and there are certain associations among them which determine whether the material may pay for mining. As far as observed at least, the presence of the soda-rich feldspars is usually associated with a comparatively fine texture, which precludes all idea of hand cobbing and sorting out of the objectionable minerals. The dark red perthite variety usually occurs in coarse granitic masses, which are also unfavourable for mining. The white to pinkish microcline on the other hand forms the bigger masses above mentioned and on the proportion of these local segregations to the whole mass, which has of necessity to be mined, depends entirely the possibility of the commercial extraction of the feldspars.

Tourmaline fortunately occurs chiefly with quartz and the soda spars and its proportion is so small that it offers no difficulties.

The black mica is the real deleterious mineral. The white mica is more resistant to the effects of weathering; when found it is usually fresh. The black mica on the other hand is hardly ever fresh; it has mostly gone over into a chloritic material and crumbles up in the hand. I have not found in any of the quarries one resil-

ient plate which could be bent without breaking. When associated with the fine textured masses, it is usually finely disseminated. But in the bigger microcline segregations the black mica forms large sheets, very seldom over one eighth inch thick, which can be cobbled off with comparative ease and therefore should not form a very great obstacle.

Quartz is the remaining mineral which might offer any difficulties. Fortunately it is of such a nature that it shatters extensively when a face is shot down or when the larger chunks are mud-capped. It can be easily separated from the valuable feldspar. As was previously mentioned these economically important, extremely coarse-textured masses are local segregations. This means that locally the centres of crystallization were far apart, giving the solution a chance to form large crystals. Therefore large masses of feldspar are always accompanied by large masses of quartz. In fact the latter are usually an indication of favourable places for exploration and development work.

Graphic granite forms a very much smaller proportion on the eastern side of the Bay and where it occurs the presence of the black mica practically precludes its being mined at a profit.

ECONOMIC ASPECTS

Depth of the Dykes.—It is very hard to estimate the economic importance of the fact that some of the pegmatite masses are only superficial caps, connected to their deeper seated source by narrow stringers which are of no commercial value. As long as calculations are based on measurements of the pegmatite above the surrounding country, there will be very little danger of overestimating the probable available tonnage of feldspar. That is to say, if no drilling or sinking to explore the vertical extent is being done, and if the pegmatite body stands sufficiently high above the surroundings to afford a good face for a quarry, the latter criterion should constitute sufficient information to warrant the opening up of that particular body. There are fortunately many pegmatite ridges in the region that answer these requirements.

On the other hand, the country rock through which the peg-

matite was forced may have a strong influence on the physical characters of the resultant dykes. I have only been able to make these observations as to the discontinuity of the dykes where the latter rested on the sediments. As I said before, the country rock on Concession No. 65 is a black hornblende-mica rock, more or less schisted, and may therefore, due to its greater homogeneity, have less tendency to split the pegmatite masses into small stringers.

For example, The St. Lawrence Feldspar Company have started a quarry (the "Lower Quarry") on a very low pegmatite body which is on the average not more than ten feet above high water level. The possible value of this part of the claim, aside from the surface showings, depends entirely on the expectation that the pegmatite body will extend downwards sufficiently to warrant the expense of erection of the necessary machinery to mine it. Still the body is so narrow at this particular place that walls which would be strong enough to hold out the sea water and also to maintain a vertical face without danger to the working men, could not be maintained for a depth much greater than thirty feet. This is quite aside from the fact that the contact walls between the pegmatite and the country rock dip to the south-east at an average angle of not more than 65° and would tend to narrow down the workable body as quarrying goes deeper. If the theory above advanced, as to the nature of these pegmatite bodies, is well founded, it has important economic consequences in the case just cited.

Quantity of Spar.—As previously stated, the possibility of commercial extraction of the feldspar depends on the proportion of the local, feldspar-rich segregations to the whole mass, which has of necessity to be mined. This proportion unfortunately cannot be foretold, but intelligent development can clear up this point. I have a few facts gathered from the operation of the quarries now being worked. The quarry from which the most material has been extracted up to the time the writer left the district, was worked in a small ridge, about 30 feet maximum height above the water and about 300 feet long. In working this quarry, two of these local segregations had been penetrated and from each approximately 600 to 700 tons of good spar had been extracted. Unfortunately no accurate data were at hand, and I had to rely entirely on the memory of the operators and their estimate of the number of cars

of material taken out. This would be approximately at the rate of 20% of good spar to the total mass which had to be mined. How far this will hold good in future operations on this eastern side of the Big Bay it is impossible to foretell.

The pottery trade and the soap manufacturers are at present the largest consumers of feldspar. For pottery work a high potash content is one of the most important considerations. Under the detailed description of the feldspars have been given analyses of several varieties. From these it is at once apparent that about 10.5% potash and 3.5% soda represent the average content of these alkalis in selected samples. It will then depend to what extent sorting is carried on, how close a bulk shipment can approach these maximum figures. The colour of none of the spars is too deep to permit of their being used for glazing purposes. At any rate, as has previously been pointed out, the dark red perthitic variety has so far been found associated with a coarse granitic structure and more or less biotite, so as to preclude its mining for pottery purposes.

For soap manufacture, on the other hand, colour has to be considered. The colour of the dark red feldspar is quite evident when powdered, and is much more pronounced when wet. This prevents its use also in connection with white soaps, quite aside from the fact that the closely associated quartz and biotite are tolerated in very small amounts only.

Graphic Granite.—The largest visible reserves of material, which may become of commercial importance, are in the form of graphic granite. The influence of the deleterious garnet has been discussed above. The answer to the question whether this material is of any commercial value depends entirely on the demand and therefore the price per ton which has to cover the additional cost of removing the garnet.

On the surface at least the texture is very uniform. Also inspection of the flanks of the ridges, together with information gained from test shots at various elevations, indicate that vertically the texture does not vary to any apparent degree. It is therefore not necessary to go into detailed calculations to show that enormous tonnages of graphic granite are available.

GENERAL CONCLUSIONS

My conclusion therefore is that the future of this region depends on intelligent development work. In connection with this I would draw attention to the following. The country has been heavily glaciated and the texture of the pegmatite varies vertically as well as laterally. Now these local segregations of spar, if exposed at the surface, would offer the least resistance to the scouring action of the ice, due to their relative softness and a highly fissile cleavage of the feldspar. It therefore stands to reason that they have been preserved only where the more intimate mixture of quartz and feldspar and the other minerals formed a protecting layer over the more easily eroded pure feldspar masses. This seems to me to be the reason why no big masses of pure spar show at the surface, and all the workings have to contend with the removal of this undesirable capping to get at the valuable mineral below.

The graphic granite on the other hand, which occurs on the other side of the Bay, appears to be more uniform vertically as well as laterally. Test shots put into the side of a hill showed a fairly uniform texture and composition within a vertical range of 40 feet.

The point is that eye inspection as to the value of the material on the east side of the Bay is very unreliable. For this reason an attempt at an estimate of the quantity of valuable feldspar, beyond that which has already been made, seems to be futile. The quantity of pegmatite within the two economically important zones is enormous, even taking into consideration that the big masses may only be superficial.

St. Lawrence Feldspar Co's Workings.—This company in the summer of 1924 had as many as 25 men working, this force being concentrated entirely on their holdings on Concession No. 65 on the east side of the Big Bay. Work was being carried on especially in two quarries, locally referred to as the upper and lower.

The upper quarry is situated on a little ridge, the western face of which consists of amphibolite, the greater eastern portion being a mass of pegmatite. During the summer of 1924 a quarry face about 12 feet high and 15 feet wide was being worked. The work had started from the southern end mainly in white microcline

under a capping of coarsely granitic material. But towards the end of the summer this capping became very heavy and also the eastern wall showed increasing amounts of coarse red granite with local splashes of dark red perthite.

The lower quarry is situated in a south-westerly direction from the upper about 600 feet away, on a little peninsula. This is the working previously referred to. The elevation being too low to get a face for quarrying, work had to be carried on on the incline.

Very good feldspar under only a very thin capping was extracted, but in August the proportion of quartz increased, cutting down the output considerably.

Drilling was done with heavy piston drills, the power being steam, derived from two vertical, coal fired boilers.

The equipment for an aerial tram arrived during the summer but was not erected until late in the fall.

Other equipment such as handtramping cars, small steam hoist for operating the incline and blacksmith shop were conveniently located between the two quarries.

A small 25 foot wharf has also been erected, and although the channel is narrow, small steamers can come in even in comparatively rough weather.

Towards the end of August upwards of 1,500 tons of good selected feldspar had been stored in stock piles, the average output being about 25 tons per day.

On the western side of the Big Bay only exploratory work has been carried on, but it was sufficient to prove the vertical homogeneity of the graphic granite.

MICA

There has been a decided falling off in the production of mica as compared with the previous year. In 1924 the sales and shipments amounted to 3,252,583 lb. valued at \$162,951. This is a decrease of 21% in quantity and of 31% in value as compared with 1923.

The figures of quantities, year by year, are not comparable, as mica is sold, by the mine operators, under various forms, rough-culled, thumb-trimmed, thin-split, and scrap mica, the values of which different grades vary from \$8 a ton for scrap mica, to \$5 a pound for extra large thumb-trimmed mica sheets.

The production of mica for the year 1924 can roughly be divided into the following proportion of grades:—thumb-trimmed 299,797 lb. valued at \$70,770; thin-split 106,750 lb. valued at \$75,750; rough culled 310,000 lb. valued at \$5,375, the balance being made up of some 1,250 tons of scrap mica at an average value slightly under \$9 a ton, sold to grinding mills, both in Canada and in the United States.

In 1924 returns were received from 52 operators, 21 of whom reported production while 31 reported their mine closed all year, or having prospected only.

Prices for thumb-trimmed mica of standard sizes during the year varied between the following limits:

1 x 1—13 to 17c. per lb.	2 x 4— 40 to 85c. per lb.
1 x 2—17 to 25c. “ “	3 x 5— 80 to 1.50c. “ “
1 x 3—22 to 35c. “ “	4 x 6—1.50 to 2.00c. “ “
2 x 3—38 to 45c. “ “	5 x 8—2.00 to 2.50c. “ “

India, United States and Canada are the three most important mica producing countries. Of these India and the United States produce muscovite exclusively, while Canada produces phlogopite, also called amber or silver mica. For electrical insulating purposes the amber mica is more prized than the muscovite, for its dielectric properties are of the highest, it is stronger and more elastic than the muscovite, and stands much higher temperatures without exfoliating or losing its elasticity.

Until three years ago Canada was practically the only country producing amber-mica. But during the war owing to restrictions, and even prohibition, of exports of various mineral substances, France which had drawn its supplies from England, was compelled, by necessity to look into the possibilities of the Madagascar deposits and to develop them, with the result that Madagascar mica,



International Magnesite Co., Ltd.—Calcining kiln at Dobbie mine.



Prospecting for Kaolin at St. Remi, Amherst township.

a phlogopite of good quality, is now finding its way into the United States market, and may become a serious competitor to Quebec mica. The Madagascar deposits are easier to mine than ours for, as in the case of graphite of that island, the country rock has been deeply weathered, and practically no blasting is necessary. Moreover the Malgache labour is extremely cheap, and, apparently, quite efficient. The mica production of Madagascar has not been very large yet, but it seems to be steadily growing.

NICKEL

The nickel industry of the Province of Quebec is essentially a metallurgical one; the province does not produce any ores of this metal, but as the refining of nickel matte requires large units of electric power the British America Nickel Corporation Ltd., erected at Deschênes, in 1917, large refining works to treat the nickel-copper matte produced from the Murray mine ore, in the Sudbury district in Ontario.

The Deschênes refinery began producing refined nickel in 1920. A short description of the plant was given in our report for that year. In 1924 the refinery was operated during the first part of the year, but in July the company went into liquidation. Later it was announced in the press that the assets of the British America Nickel Corporation, including the Deschênes refinery, had been acquired for \$5,000,000 by a legal firm of Toronto for unnamed clients.

MINERAL PAINTS

Sales and shipments of natural iron oxides amounted to 7,129 tons valued at \$88,540. Compared with the previous year 1923, when the figures were 9,837 tons valued at \$116,402 it is a decrease of 27% in quantity and 24% in value.

The principal producer is the *Canada Paint Company Ltd.*, affiliated with the Sherwin-Williams Paint Co., who operate deposits of natural oxides as well as calcining and grinding works, at Red Mill, on the Canadian Pacific Railway line, east of Trois-Rivières.

Thos. H. Argall operated some deposits at Pointe-du-Lac, also on the Canadian Pacific Railway, eight miles west of Trois-Rivières, from which he has been shipping raw oxides for many years. The Pointe-du-Lac product is shipped to many cities in Canada, where it is used as a gas purifier.

The *Montmorency Paint Products Co. Ltd.*, who owns deposits of iron oxide and a mill at Ste. Anne-de-Beaupré, on the St. Lawrence, 24 miles below the city of Quebec, also effected some small shipments.

On a previous page of the present report under the heading of Titaniferous iron ores, as well as in our Annual reports for 1921 and 1922, reference was made to the possibility of utilizing our large ilmenite deposits for the manufacture of Titanium White, a pigment which appears to be establishing itself permanently in the paint industry. It is now manufactured in appreciable commercial quantities in Norway and in the United States. The following paragraphs are interesting and show the progress which the manufacture of this substance is making in the United States.

"Buckman & Pritchard, Inc., a subsidiary of the Titanium Pigment Co. Inc., with works at Niagara Falls, N. Y., concentrates the sands four miles south of Pablo Beach, Fla. This deposit of ilmenite is found on the ocean beach between high and low-tide levels, and it is scraped up and sent to a wet concentrating mill, where the ilmenite is concentrated and the monazite, zircon, and some other materials are separated from it. The rutile, which constitutes a very small quantity compared with the remaining ilmenite product, is separated and makes a small by-product.

"During the year 1922, 4,581 tons of ilmenite carrying probably about 52 per cent. of TiO_2 was shipped to Niagara Falls to be used for the manufacture of both ferrotitanium by the Titanium Alloy Co., an affiliated company, and titanium pigment by the Titanium Pigment Co., Inc."

"It is of interest to note that the Titanium Pigment Co., which is a subsidiary of the National Lead Co., is negotiating for the purchase of the plant of the Mineral Refining & Chemical Corpn., in St. Louis. The Titanium Pigment Co. manufactures "titanox,"

a new pigment composed of titanium oxide and blanc fixe. By securing a plant at St. Louis the company would be able to increase its output and also would be nearer the source of supply for barytes." *

It was learned that in 1924, a plant to manufacture titanium white pigments on a large scale, several hundred tons a month, was installed at St. Louis, Mo., which permits to produce the paints at a much lower price than was possible at the Niagara Falls plant.

KAOLIN AND FIRE CLAY

There were no shipments of China clay in 1924 from the deposits of Amherst township.

The deposits of St. Rémi d'Amherst, which are the only ones known in Canada, were discovered in 1895, but as they were at the time some 45 miles distant from a railway they lay dormant until the advent of rail communication, and in 1912 the *Canadian China Clay Co.* was organized to work them. The operations of this company have been noted yearly in the Reports on Mining Operations and more particularly for the years 1914, 1915, 1916, and 1922.

In 1923 the property of the company, which comprises parts of lots 2 to 8, range VI South of Amherst township, with washing plant, was put into the hands of a trustee for the bondholders, and there were no operations whatever in 1924. The trustee is the National Trust Co. Ltd., Montreal.

In 1923, the *British Metal Corporation (Canada) Ltd.*, carried on some prospecting work on lots 9 and 10 of the same range, on what is apparently an extension of these china clay deposits. These investigations were continued in 1924, but no actual mining was undertaken.

The presence of kaolin has been observed on all the lots from 2 to 12 of range VI South of Amherst township, a distance of practically 8,000 feet in length.

(*) From "The Mineral Industry in 1923," McGraw Hill Book Company, New York.

TALC AND SOAPSTONE

The production of talc in 1924 was 449 tons, valued at \$20,273. It is a slight decrease in value.

This represents, in the main, the production of white soapstone blocks (compact talc), used for lining alkali recovery furnaces, in the pulp mills using the sulphate process. This soapstone is of excellent grade, contains very little grit and grinds practically white.

This industry of soapstone blocks production was started by Mr. L. R. Cyr in 1922, on a compact talc deposit near Robertsonville, on lot 4, range V of Thetford township, where he erected a cutting shed, sheltering circular saws run by gasoline engines, to cut blocks to sizes required by the consumers. The *Robertsonville Soapstone Quarry Co.* was formed in 1923, with Mr. L. R. Cyr, as manager, and since then the cutting installation has been removed to better deposits in the second and third ranges of the same township.

The compact talc blocks produced by the Robertsonville Soapstone Quarry Co. are used by all the Quebec sulphate pulp mills, and some are also shipped to New Brunswick. The main demand is for blocks measuring 6 x 6 x 12 inches and 6 x 6 x 18.

PEAT

There has been no returns of production of peat in the Province of Quebec since 1919, when a small production was recorded from the operation of a bog near Garneau Junction.

In 1924, a company called *La Compagnie de Charbon Artificiel de Québec*, with head office in Quebec city, was organized with the intention of establishing a plant at Garneau Junction for the production of carbonized peat. From the latest advice received, the erection of the necessary buildings was begun in the early spring of 1925.

Another company, *La Compagnie de Tourbe, Ltée*, with head office in Montreal was incorporated in 1923 and intended to produce peat in 1924, but it reports that it has not yet started operations.

BUILDING MATERIALS

(*Henri Gauthier*) *

There is a marked decrease in the value of the building materials production in the Province during 1924. The falling off of this value from last year is about 14 per cent and it remains about what it was in 1922. It amounts to \$11,380,977 as compared with \$13,169,982 for 1923 and \$11,760,508 for 1922.

The building materials represented 62 per cent of the total value of the mineral production of the Province in 1923, and they enter for 60 per cent of this value in 1924.

The number of stone quarries, brick yards, and lime kilns which were in operation in the Province is found to be nearly the same as that of last year, a much larger number of sand and gravel pit owners, however, reported activities for 1924.

The operation of these stone quarries, sand and clay pits, and of their annexed plants gave employment to 4,555 men in 1924 as compared with 4,725 men in 1923. It is a slight decrease of 4 per cent. The amount paid in wages reached \$3,745,087 in 1923, while in 1924 this sum was \$3,665,975. Therefore the decrease here, which is approximately of 2 per cent, shows, if we consider the number of men who were employed, that the salaries paid in the quarry industries during last year were but slightly higher than those paid during the previous year. A glance at the statistical figures for the various quarry products, as given in the table of the mineral production on page 8, will show that the decrease of the total value of the building materials produced is due mainly to the lower production of brick and cement during the year. It may be noted, however, that important increases over last year in quantities, value, number of men employed and wages paid were recorded by the limestone, marble and sandstone quarries. A decrease of 42 per cent, however, in the value of products sold was reported by the granite quarries. The lime industries and the sand and gravel producers also showed greater activities in 1924 than in past years.

* Inspector of Mines, Quebec Bureau of Mines.

Of all materials of construction, cement remains the most important. While brick came next in past years, the limestone quarries showed in 1924 a greater value of production having reached the record figures of \$2,276,248 with an increase of 13 per cent over 1923 both in tonnage and in value. Next in the order of their importance as regards value of production are the following materials of construction: lime, sand, granite, marble, and sandstone. The slate quarries of the Province, which at one time were prosperous and again showed a renewal of activities in 1921, when they produced crushed slate for roofing purposes to an amount of \$48,766, remained idle during the past year.

The operation of the quarries and their allied industries in the Province depends on the activity in the building industry, and the production of cement and brick is usually taken as an index of that activity.

The official figures for permits of construction, as published by the Dominion Bureau of Statistics, show, that construction work in Canada was slightly less active in 1924 than in 1923 or 1922, but that the situation was better than in 1921 or 1920. However, the value of building permits issued during 1924 in six of the leading cities of the Province of Quebec was higher than in 1923. The increase was most pronounced; the proportion of the permits issued rose from 26.6 per cent of the 1923 total for the Dominion to 34.6 per cent of the aggregate for 1924.

According to official figures the total building activities in Montreal for the year 1924 surpass the record of any previous year by the large sum of \$3,887,556, the grand total amounting to \$31,022,659, an increase of 30 per cent over 1923. Quebec city also claims to have nearly doubled its building activities in 1924.

It may be pointed out that this record building year for the two largest cities of the Province has been achieved without very many large buildings, as during 1924 most of the building permits issued were for dwelling houses.

Moreover few important engineering constructions were carried on during the year in the Province.

The discrepancy shown by the decided decrease in the building materials production and the large increase in the amount of the estimated cost of proposed buildings for which permits were issued by the more important cities of the Province may be attributed to the residential character of these constructions. In fact the building of dwelling houses involves a comparatively higher cost of workmanship than in large industrial constructions or important engineering works. Moreover, in residential buildings lumber enters to a larger extent than in large constructions, and also artificial stone is becoming every year of more and more common use.

Quarrying is also closely connected with the city street paving and the improvement and maintenance of rural roads and main highways throughout the Province. By far then the greater tonnage of crushed stone, sand, and gravel produced is used as road metal. Railroad ballasting also absorbs every year large quantities of these materials.

CEMENT

The statistics on cement production show that the sales in 1924 totalled 2,754,979 barrels valued at \$4,796,959 as against 3,173,993 barrels valued at \$6,347,986 in 1923. The average selling price f. o. b. plant, was \$1.74 per barrel. The prices in 1923 and in 1921 were \$2.00 and \$2.53 respectively.

For this year again Plant No. 1 of the Canada Cement Company Limited at Montreal East was the only cement mill in operation. A certain amount of repair work, however, was performed during the summer at the Hull plant of the same company in preparation for a contemplated renewal of operations in a near future.

The two new companies: *The Unic Cement Ltd* and *The National Cement Co. Ltd.* have made considerable progress in the erection of their mills at St. François de Sales and Montreal East respectively. Most of the machinery has been received and put up during the year. The first mentioned of these two companies, conforming to the Mining Law notified on November 6th that mining operations in their limestone quarry was started on November 3rd 1924.

BRICK

The brick industry showed less activity in 1924 than in 1923. Although the number of brick plants in operation remained almost the same as in the past few years, the output showed a decrease of nearly 10 per cent from the previous year.

The total value of the brick made in 1924 amounts to \$1,859,330 as against \$2,018,349 in 1923, a falling off of 8 per cent. The number of brick made, 85 per cent of which were common brick, is 115,251 thousands as compared with 127,289 thousands in 1923. The price of brick, then, remained practically what it was in 1923; the average price for common brick being \$13 per thousand while the prices for face or pressed brick ranged from \$25 to \$30 per thousand.

As the number of men employed in that industry fell from 1,240 in 1923 to 946 in 1924, a drop of 24 per cent, and since the wages paid were \$697,550 and \$679,064 in 1923 and in 1924 respectively, the wages earned by the brick makers were consequently higher in 1924 than in 1923.

Three-quarters of the total number of bricks manufactured in the Province of Quebec in 1924 were produced at Laprairie which remains the chief centre of the brick making industry. The several brick yards operated there are those of the National Brick Co. Limited and of the St. Lawrence Brick Co. The other important brick plants of the Province are the Citadel Brick and Paving Block Co. Ltd. at Boischatel, the Sherbrooke Brick Company, Ltd., at Sherbrooke, the Ascot Tile and Brick Co. Ltd., at Ascot Corner, the Alex Mills Brick Co. Reg'd at Ormstown, Ernest Beaudet at Village Deschailions, the Granby Clay Products Ltd., and L'Industrielle de St. Tite Limitée.

The newly incorporated companies are the Sherbrooke Brick Company Ltd., La Brique de Scott Limitée, formerly La Compagnie de Briques de Scott Jct., La Cie de Brique et Béton Ltée, at Amos, and E. P. Suddard Brick Works, Gaspé, Qué. In December 1924, the Metis Shale Brick Co. Limited, at St. Octave de Métis, made an assignment and its plant was closed.

The Annual report of the National Brick Company of Laprairie Limited, states that the demand for brick during their fiscal year ending February 28th allowed their plant to maintain the production to but 60 per cent of its capacity. It may be stated that this condition prevailed in a general manner in all the brick-plants of the province, as there are some twenty brick yards in the Province, some of these being equipped with most modern mechanical appliances, which can produce presumably over 200,000 thousands bricks per year.

POTTERY

These statistics do not account for the manufacture of ceramic wares made from foreign clays. Besides brick manufactured from local clays, the clay working industry in the Province includes many other articles most of which are made from vitrifying clays imported from the State of New Jersey. Amongst these products are refractory wares, sewer pipes, and sanitary pottery. The figures referring to the production of tile drain, sewer pipe and pottery in the table of mineral production on page 8 account for products made up of local clays only. The value of clay products made of imported clays which are not included in our mineral statistics amounted to \$195,412 for the year 1924. The industry employed 180 men who received \$213,901 in wages. The principal center of this industry, which is an important one, is at St. John.

LIMESTONE

During 1924, as in past years, limestone of the Trenton, Black River and Chazy formations were extensively quarried for building purposes. These limestones which outcrop at frequent intervals and are of common occurrence along the St. Lawrence valley and in the vicinity of the more important centres, remain the chief source of building stone of the Province. By far the greater tonnage of that class of rock is crushed for road metal or concrete aggregate but it also supplies a large proportion of the dimension stone.

Out of a total of 1,638,660 tons of limestone quarried, 1,498,262 tons valued at \$1,668,407 was sold as crushed stone for concrete

making, road building or ballasting purposes. Operations on a large scale by the more important quarries tend to materially reduce the cost of production of crushed stone in the Province.

The building stone produced by the limestone quarries amounts to \$523,750 in value or 23 per cent of the total value of the bulk of limestone quarried. Moreover some 80,000 tons, a large proportion of which went towards the manufacture of calcium carbide, was shipped to the pulp mills and other industries.

The broken stone industry as illustrated by the above figures is becoming more and more important. This industry gives work to a great many workmen, and, as shown by the table of the mineral production on page 8, it comes next to the asbestos mining with respect to the amount of wages paid and number of men employed. The value of its products is next to that of the cement industry.

Limestone quarries are found almost everywhere throughout the settled part of the Province, but the Montreal district is above all the place where the greater tonnage of crushed limestone is produced. The other important centres of production are Joliette, Beauport, and Hull.

Most of the cut stone used in the construction of large buildings during the year, as in the past, came from St. Marc des Carrières, St. François de Sales and Cap St. Martin.

Several new companies were incorporated during the year, they are: The Consolidated Crushed Rock Ltd., A. Dupré Co., The Rosemont Quarry Co., La Carrière Laurentide, Ltée., The Quebec Stone and Products, Ltd.

LIME

The chemical industry is now the most important customer of the lime kilns, and only a comparatively small part of the lime produced is used in the building industry. The old intermittent wood-burning kilns are now replaced by modern continuous kilns of large output fired with coal or by producer-gas. Only a few of the old stone kilns scattered all over the Province and the number of which was estimated at 200 in 1900, were fired during 1924.

A total of 86,274 tons of lime was produced last year valued at \$684,581. This is an increase of 16 per cent both in tonnage and in value over the preceding year. The price of lime showed a wide range of variation, the average price however remained at \$10 per ton.

The St. Maurice Lime Company Limited which operated an important plant near Trois-Rivières was put into liquidation towards the end of the year.

A new company *The Canadian Lime Co. Ltd.*, of Trois-Rivières was incorporated but has not yet started operations.

MARBLE

The Missisquoi marble quarries at Phillipsburg operated by the Wallace Sandstone Co., produced the entire supply of local marble used as decorative or monumental stone. The Marbre National, Limitée, at l'Annonciation, and the White Grit Co. formerly the Pontiac Marble & Lime Co. Ltd., at Portage du Fort, have each produced fairly large quantities of crushed marble and granules for terrazzo flooring or white stucco work.

It is gratifying to note that the value of marble sold in 1924 is 40 per cent higher than what it was in 1923, and that the tonnage of marble quarried is 80 per cent above last year's output.

GRANITE

The Stanstead granite area remains the chief centre of the granite-quarrying industry in the Dominion with five firms shipping stone at the present time and not less than ten quarries in operation. Granite for the construction of public buildings has been extensively quarried in that district during the past years at Beebe and Graniteville. With reference to the Stanstead granite, Dr. W. A. Parks writes in the 1925 April issue of the Bulletin of the Canadian Institute of Mining and Metallurgy on Canada's Resources in Building Stone, that: "about 130,000 cubic feet of granite was produced in 1924. Building stone is quoted at \$1.00 per cubic foot f. o. b. quarries but monumental stone may cost as much as \$3.00 per cubic foot. Freight rates from Stanstead per cubic foot

are as follows: to Montreal, 30 cents, to Halifax 54 cents, to Toronto 47 cents. The stone is used chiefly for building but an increasing amount is finding its way into monumental work. For ordinary buildings Stanstead granite costs about 50 per cent more to finish than soft limestones but the increased cost is more than justified by the enhanced beauty and durability of the structure."

Granite building stone was also produced during the year at St. Sébastien, St. Samuel, Scotstown, and Rivière-à-Pierre.

Ornamental and monumental stone was especially taken out of the Mount Johnson, Stanstead and Brownsburg quarries.

Important quantities of paving blocks and curbstone were cut at Beebe, Brownsburg, Rivière-à-Pierre and Guénette near Mont-Laurier. Huge blocks were quarried during the summer at *Brodie's Limited* quarry at Guénette for the making of press rolls.

The *Rigaud Granite Quarries Ltd.* which was incorporated during the year to work a quarry on the northern slope of Rigaud Mountain facing Rigaud village started in the early fall the installation of a crushing plant and of an incline. This company intends to produce crushed granite, paving blocks and rough building stone, counting on the feasibility of water transportation to Montreal. Another new company the *Silver Granite Co.*, incorporated during the year, worked a granite quarry at St. Samuel Station in connection with the building of the new Basilica of Ste. Anne de Beaupré.

SANDSTONE

During the past few years hardly any building stone has been taken out of the sandstone quarries of the Province. Crushed stone, however, for concrete or road work was produced at Levis, St. David, Sillery, Ste. Foye and Mélocheville. A small quantity of paving blocks was cut near Ste. Scholastique for the Sydney Kirby Co. Ltd., of Ottawa.

SAND

The production of sand is closely connected with the building industry and while each year large quantities are used in municipal

paving work and road making, during periods of building activity in cities it represents in tonnage a large proportion of the building materials produced in the Province.

For comparison purposes in connection with the consumption of building materials, the tonnage of sand used should be considered in preference to its monetary value, as this value is dependent on the distance between the deposit and the place where the material is to be used and to the transportation facilities. The price of sand varies greatly; this material may be obtained at 10 cents per cubic yard in small country pits, while it may cost \$1.35 and upwards delivered on the works in cities.

Until 1923 reports from some twenty-five sand and gravel operators were received each year which accounted for the statistics on sand. This year the number of firms and pit owners who made returns of their production to the Bureau of Mines has more than doubled.

According to statistics the amount of sand and gravel used in the Province in 1920 had reached the figure of nearly 400,000 tons estimated at \$206,433. In 1923 the tonnage of building sand used was 1,340,970 tons valued at \$453,383. In 1924, because of the larger number of the smaller pit owners who reported their production the quantity of sand produced amounts to 2,359,235 tons valued at \$498,866. Out of this total 825,000 tons valued at \$157,000 was used as railway ballast.

Were the production of all the sand and gravel pits, which are found nearly everywhere in the Province and which supply all the gravel for rural road construction, included in these statistics, these figures would very likely be materially increased. The chief centres of sand production are the districts of Joliette and of South Durham. Sand is also obtained on a large scale from the beds of the river St. Charles at Quebec and of the lake of Two-Mountains, and at Mount-Johnson.

**LIST OF THE PRINCIPAL OPERATORS AND OWNERS
OF MINES AND QUARRIES IN THE PROVINCE
OF QUEBEC**

ASBESTOS

- Asbestos Corporation of Canada, Limited,**
Thetford Mines, Que.
- Asbestos Fibre Co., Inc.,**
Black Lake, Que.
- Asbestos Mines, Limited,**
East Broughton, Que.
- Asbestos Quarries, Ltd.,**
Black Lake, Que.
- Black Lake Asbestos and Chrome, Co., Limited,**
Black Lake, Que.
- Canadian Johns-Manville Co., Limited,**
Asbestos, Que.
- Consolidated Asbestos, Limited,**
Thetford Mines, Que.
- Federal Asbestos Company,**
Robertsonville, Que.
- The Frontenac Asbestos Mining Co.,**
F. W. Ross, 92 St. Peter Street, Quebec City.
- General Asbestos Limited.,**
Dominion Express Bldg., Montreal.
- Johnson's Company,**
A. S. Johnson, Mgr., Thetford Mines, Que.
- Keasbey & Mattison Company,**
Bell Asbestos Mines Department, Thetford Mines, Que.
- Maple Leaf Asbestos Corporation, Limited,**
Thetford Mines, Que.
- Northern Asbestos Co., Ltd.,**
Thetford Mines, Que.
- D. H. Pennington, Ltd.,**
Thetford Mines, Que.
- Quebec Agency, Ltd.,**
Thetford Mines, Que.
- Quebec Asbestos Corporation,**
E. E. Spafford, Mgr., East Broughton, Que.
- Queen Asbestos, Limited,**
St. Cyr, Richmond county, Que.
- Universal Asbestos Co.,**
Thetford Mines, Que.

CHROME

- Black Lake Asbestos & Chrome Co., Limited,**
Black Lake, Que.
- Dominion Mines & Quarries, Limited,**
Canada Life Building, Toronto, Ont.
- Quebec Chrome Corporation, Ltd.,**
Black Lake, Que.
- Victory Chrome Mines, Ltd.,**
103 St. François Xavier, Montreal.

COPPER

- Canadian American Copper Refining Company, Limited,**
Eastman, Que.
- Estate Pierre Tétreault,**
730 De Lorimier St., Montreal.
- Eustis Mining Company,**
F. M. Passow, Manager, Eustis, Que.
- Noranda Mines, Ltd.,**
Suite 603-4 Royal Bank Bld'g., Toronto.
- Geo. E. Smith,**
823 St. Antoine, Montreal.

DOLOMITE

- White Grit Company,**
Portage du Fort, Que.

FELDSPAR

- Buckingham Feldspar, Ltd.,**
Room 45-207 St. James St., Montreal.
- Wm. & J. J. Cameron,**
Buckingham, Que.
- Canadian Amber Mica Co.,**
P. O. Box 246, Station B, Montreal.
- Louis Couture,**
Buckingham, Que.
- Feldspar Corporation of North America,**
Room 4-25 St. James St., Montreal.
- Em. Lapointe,**
Notre-Dame de la Salette, Que.
- Laurentian Feldspar Co., Ltd.,**
82 Notre-Dame St. W., Montreal.
- O'Brien & Fowler,**
114 Wellington St., Ottawa.
- Quebec Feldspar Co.,**
Rm. 60-232 St. James St., Montreal.
- St. Lawrence Feldspar Co., Ltd.,**
55 St. François Xavier, Montreal, Que.
- Mrs. A. R. Whittemore,**
424 Lisgar St., Ottawa, Ont.
- Bush Winnipeg,**
N.-D. de la Salette, Que.

GOLD

- Alderson & MacKay,**
802 New Birks Bldg., Montreal.
- Amulet Gold Mines, Ltd.,**
301 Dominion Express Bldg., Montreal.
- Archean Mines Development Co., Ltd.,**
301 Union Bank Bldg., Ottawa.
- Argonaut Gold, Ltd.,**
301 Dominion Express Bldg., Montreal.
- Arntfield Gold Syndicate,**
Room 313, Colonial Bldg., Toronto.
- Bell-Thompson Mining Syndicate,**
c-o E. J. Thompson, New Liskeard, Ont.

- Boischatel Gold Mining Syndicate,**
c-o Redmond Quain, 56 Sparks St., Ottawa.
- Brownlee Gold Mines Ltd.,**
910 Royal Bk. Bldg., Toronto.
- Canada Gold Syndicate, Ltd.,**
36 King St., Toronto.
- Carleton-Rouyn Syndicate, Ltd.,**
196 Sparks St., Ottawa.
- The Chance Syndicate,**
c-o Alex Gray, 1032 Dorchester St.-W., Montreal.
- Clark-Bourlamaque Gold Mines, Ltd.,**
282 Ste. Catherine W., Montreal.
- Clark Syndicate,**
c-o W. A. Read, 70 W. 40th St., New York.
- Compagnie Minière de Bell River-Nottaway, Enrg.,**
c-o Adh. Gagnon, 4 Notre Dame St., Quebec.
- Crown Reserve Mining Co., Ltd.,**
Larder Lake, Ont.
- John Dalton,**
Timmins, Ont.
- Dasserat-Rouyn Goldfields, Ltd.,**
c-o H. L. J. Blake, 204 4th Avenue, Ottawa.
- Don Rouyn Gold Mines Ltd.,**
412, Dominion Express Bldg., Montreal.
- The Dubuisson Gold Mining Co., Ltd.,**
c-o J. M. Forbes, Timmins, Ont.
- Explorer Syndicate,**
c-o W. M. Goodwin, Gardenvale, Que.
- Fournière Gold Mines Ltd.,**
52 Spadina Ave., Toronto.
- Frontier Syndicate,**
c-o H. J. Stewart, 136 St. James St., Montreal.
- The Harricana Gold Mines, Ltd.,**
507 Banque Nationale Bldg., Quebec.
- The Huronian Belt Co., Ltd.,**
Box 3, Haileybury, Ont.
- Kienawisik Gold Mining Co., of Portland, Maine,**
15 Congress St., Boston, Mass.
- Kienawisik Mines Ltd.,**
Amos, Que.
- The Kinojevis Syndicate,**
c-o Roy Driscoll, Temiscaming.
- Lakeside Majestic Gold Mines Ltd.,**
75 Sparks St., Ottawa.
- La Rose Mines Ltd.,**
Cobalt, Ont.
- Laurentian Gold Mines, Ltd.,**
c-o H. J. Stewart, 136 St. James St., Montreal.
- The Lepine Gold Mines Co.,**
Room 108-502 Ste. Catherine St. East, Montreal.
- Malartic Mining Co.,**
200 Laurier Ave., Ottawa.
- McIntyre-Porcupine Mines Ltd.,**
Standard Bank Bldg., Toronto.
- Montreal Exploration Co., Ltd.,**
Rm. 410-97 St. James St., Montreal.
- Montreal Rouyn Mines Ltd.,**
Rm 1—55 St. Francis Xavier St., Montreal.

- New York Rouyn Syndicate,**
402 Dominion Express Bldg., Montreal.
- Nipissing Mining Co.,**
Cobalt, Ont.
- Noranda Mines, Ltd.,**
603-4 Royal Bank Bldg., Toronto.
- The Northern Quebec Goldfields and Exploration Co.,**
Trois-Rivières, Que.
- M. J. O'Brien, Limited,**
Cobalt, Ont.
- The Osisko Syndicate,**
P. O. Box 249, Haileybury, Ont.
- Ottawa Rouyn Mines, Ltd.,**
205 St. James St., Montreal.
- Pelletier Lake Mining Co., Ltd.,**
Canada Life Bldg., Ottawa.
- Powell-Rouyn Gold Mines Co., Ltd.,**
Excelsior Life Bldg., Toronto, Ont.
- Pre-Cambrian Shield Co.,**
Room 53-302 Bay St., Toronto.
- Quebec Gold Rand Ltd.,**
Transportation Bldg., Montreal.
- Auguste Renault.**
Ville Marie, Que.
- Renfrew Gold Mines Co.,**
Renfrew, Ont.
- Rouyn Center Gold Syndicate,**
c-o N. B. Davis, Ottawa.
- Rouyn Consolidated Mining Co., Ltd.,**
Room 810-120 St. James St., Montreal.
- Rouyn Gold Mines Ltd.,**
Rm 201—205 St. James St., Montreal.
- Rouyn Gold Pan Syndicate, Ltd.,**
P. O. Box 378 New Liskeard, Ont.
- Rouyn Quebec Mines Ltd.,**
Rm 201—205 St. James St., Montreal.
- Siscoe Gold Mines, Ltd.,**
Rm 606 Shaughnessy Bldg., Montreal.
- Stabell Gold Mines, Ltd.,**
228 King St., East, Toronto.
- Le Syndicat Minier de Ville-Marie,**
Ville Marie, Que.
- The Tonopah Canadian Mines Company,**
P. O. Box 988. Haileybury, Ont.
- Union Mining Corporation, Ltd.,**
P. O. Box 222. Amos, Que.

GRAPHITE

- Canadian Graphite Corporation,**
425 Phillips Square, Montreal.
- North American Graphite Co., Ltd.,**
Buckingham, Que.
- North Quebec Mining Development Company, Limited,**
Gédéon Frédette, St. Rémi d'Amherst, Que.
- Quebec Graphite Co., Limited,**
c-o R. C. Rowe, Buckingham, Que.

IRON & TITANIC IRON

- American Titanic Iron Co., Ltd.,**
J. H. Boisvert, Parliament Bldg., Quebec City.
- Baie St. Paul Titanic Iron Ore Co.,**
J. O. Paré, Manager, Baie St. Paul, Charlevoix Co., Que.
- The Loughborough Mining Co., Limited,**
Sydenham, Ont.
- Manitou Iron Mining Co.,**
e-o J. E. Wilder, 323 Bleury St., Montreal.
- Frank H. Bignell,**
10 Hebert St., Quebec.

KAOLIN

- The Canadian China Clay Co., Limited,**
Huberdeau, Que.
- The British Metal Corporation (Canada), Limited,**
Room 706—263 St. James St., Montreal.

MAGNESITE

- International Magnesite Co., Limited,**
Calumet, Que.
- North American Magnesite Producers, Limited, and
Scottish-Canadian Magnesite Co., Limited,**
Operating jointly, Address: Magnesite, Que.

MICA

- W. Ahearn, Jr.,**
538 McLaren St., Ottawa.
- Thos. H. Argall,**
Pointe-du-Lac, Que.
- Blackburn Bros., Ltd.,**
Union Bank Bldg., Ottawa.
- Brown Brothers,**
Cantley, Que.
- Canadian Amber Mica Co.,**
P. O. Box 246 Station B, Montreal.
- The Capital Mica Co. Limited,**
W. Ahearn, Manager, 538 MacLaren St., Ottawa.
- Chabot & Co.,**
124 Rideau St., Ottawa.
- Isidore Cheslock, Sr.,**
High Falls, Que.
- M. J. Cooper,**
Hull, Que.
- H. C. Cross,**
Cantley, Que.
- W. C. Cross,**
Cascades, Que.
- David De Rainville,**
St. Pierre de Wakefield, Que.
- Jos. De Rainville,**
St. Pierre Wakefield, Que.
- Dougherty Brothers,**
Wakefield, Que.

- H. T. Flynn,**
106 Montcalm Street, Hull, Que.
- Gauthier & Guilbault,**
Buckingham, Que.
- K. Kilbourn,**
Magnesite, Que.
- The Laurentide Mica Company, Ltd.,**
119 Queen Street West, Ottawa.
- The Loughborough Mining Co.,**
c-o G. W. McNaughton, Sydenham, Ont.
- A. G. Martin,**
236 Besserer St., Ottawa.
- McGlashan Mining Syndicate,**
Cantley, Que.
- John McLaren,**
Ste. Rose de Lima, Que.
- Jos. Morris,**
Wilson's Corner, Que.
- J. B. Nault,**
Rivière Desert, Que.
- Ernest Poulin,**
Cantley, Que.
- Joseph Wallingford,**
Perkins Mills, Que.
- Wallingford Bros., Limited,**
Perkins, Que.
- Wallingford Mica & Mining Co.,**
Banque Nationale Bldg., Ottawa, Ont.
- Edward Watts,**
Dodd's Lake, Que.
- Wilson, S. E.,**
Cascades, Que.
- Bush Winning,**
Notre-Dame de la Salette, Que.

MINERAL WATER

- Abenakis Springs Company, Limited,**
W. E. Watt, Manager, Abenakis Springs, Que.
- Eaux Minérales Naturelles de St. Valier, Enrg.,**
St. Vallier, Bellechasse Co., Que.
- Alfred Ferland,**
Village St. Benoit, Two-Mountains Co., Que.
- Radnor Water Co., Limited,**
Lewis Bldg., Montreal, Que.
- Cyprien Roy,**
St. Germain, Kamouraska Co., Que.
- D. Veillet, & Cie.,**
Ste. Geneviève Batiscan Co., Que.

MOLYBDENITE

- Canadian-Wood Molybdenite Co. Ltd.,**
Quyon, Que.
- The Height of Land Company,**
S. P. Wilson, Mgr., 316 St. James St., Montreal.
- Molybdenite Reduction Co., Ltd.,**
52 St. James Street, Montreal.

- National Molybdenite Co., Ltd.,**
624 Federal Bldg., Toronto, Ont.
St. Maurice Mines Co., Ltd.,
c-o W. J. Haines, 1011 Chesnut St., Philadelphia, Pa.

OCHRE AND IRON OXIDE

- Thos. H. Argall,**
P. O. Box No. 5, Three Rivers, Que.
The Canada Paint Co., Limited,
Jos. Bradley, Supt., Red Mill, Que.
Canadian Oxides & Ochres,
2973 Notre Dame St., E., Montreal.
The Champlain Oxide Co.,
Lucien Carignan, Manager, Three Rivers, Que.
Montmorency Paint Products Co., Ltd.,
c-o Dr. Ph. Hamel, d'Aiguillon St., Quebec city, Que.
Paint River Oxide Co., Reg'd.,
39 St. Paul St., Quebec city, Que.

PEAT

- La Compagnie de Charbon Artificiel de Québec, Ltd.,**
Garneau Jet., Que.
La Compagnie de Tourbe Ltée,
P. O. Box 2468, Montreal.

PHOSPHATE

- Blackburn Bros.,**
H. L. Forbes, Manager, Union Bank Bldg., Ottawa.
Jos. De Rainville,
St. Pierre de Wakefield, Que.
O'Brien & Fowler,
114 Wellington St., Ottawa.
Wallingford Bros., Limited,
Perkins, Que.
Edward Watts,
158 Wellington St., Hull, Que.

SILICA, Rock and Sand

- Wm. Cameron,**
Buckingham, Que.
The Canadian China Clay Co., Limited,
Huberdeau, Que.
O'Brien & Fowler,
114 Wellington St., Ottawa.
A. Sicard,
St. Canute, Que.
Silico, Limited,
103 St. François Xavier St., Montreal.

SILVER

- The British Metals Corporation (Canada), Ltd.,**
Notre-Dame-des-Anges, Portneuf Co., Que.
Eustis Mining Co.,
F. M. Passow, Manager, Eustis, Que.

TALC

- Louis Cyr,**
Robertsonville, Que.
- Federal Asbestos Company,**
Robertsonville, Que.
- J. N. Martel,**
Belmina, Wolfe Co., Que.
- Geo. R. Pibus,**
Knowlton, Que.
- The Robertsonville Soapstone Quarry Co.,**
Robertsonville, Que.
- C. V. M. Temple,**
175 Spadina Road, Toronto.

ZINC AND LEAD

- The British Metals Corporation (of Canada), Ltd.,**
Rm. 706—263 St. James St., Montreal.
- Federal Zinc and Lead Co., Ltd.,**
602 Drummond Bldg., Montreal, Que.
- Messrs. Lyall & Beidelman,**
Room 602 Drummond Bldg., Montreal.
- The New Richmond Mining Co.,**
New Richmond, Que.
- North America Mining Co.,**
New Carlisle, Que.

BRICK

- Ascot Tile & Brick Co., Limited,**
Ascot Corner, Que.
- Ernest Beaudet,**
Village Deschaillons, Que.
- La Brique de Scott, Limitée,**
Scott Junction, Que.
- P. Cartier,**
Ormstown, Que.
- The Citadel Brick & Paving Block Co., Limited,**
P. Galarneau, Manager, 421 St. Paul St., Quebec City.
- La Cie Brique et Béton, Limitée,**
Amos, Que.
- La Compagnie de Briques de L'Abitibi,**
Amos, Que.
- La Compagnie de Briques de l'Islet, Ltée,**
L'Islet Station, Que.
- La Compagnie de Briques de Matane,**
St. Jérôme de Matane, Que.
- Jos. Desrochers,**
Warwick, Que.
- Oscar Godard,**
Mont Laurier, Que.
- Granby Clay Products, Limited,**
P. O. Box 266, Granby, Que.
- Joseph Gravel,**
Acton Vale, Que.
- David F. Hodgins,**
Shawville, Que.

- Lucius Laliberté,**
Deschaillons, Que.
- L'Industrielle St. Tite, Limitée,**
St. Tite, Champlain Co., Que.
- Emile Longpré,**
St. Félix de Valois, Que.
- Amédée Mathieu,**
Victoriaville, Que.
- The Metis Shale Brick Co., Limited,**
St. Octave de Métis, Que.
- National Brick Co. of Laprairie, Limited,**
Canada Cement Company Bldg., Montreal.
- Proulx Brothers,**
Richmond, Que.
- Sherbrooke Brick Company Ltd,**
Sherbrooke, Que.
- The St. Lawrence Brick Co., Limited,**
71 St. James Street, Montreal, Que.
- E. P. Suddard Brick Works,**
Gaspé, Que.

CEMENT

- Canada Cement Co., Limited,**
F. P. Jones, Manager, Canada Cement Co. Bldg., Montreal.
- The National Cement Co. Ltd.,**
120 St. James St., Montreal.
- Unic Cement Limited,**
St. Denis Bldg., 294 St. Catherine St. East, Montreal.

GRANITE

- Amédée Beaudoin,**
Stanhope, Que.
- Jos. Bergeron,**
Almaville, Quebec,
- Aug. Bernier,**
Roberval, Que.
- Louis Bertrand,**
Shawinigan Falls, Que.
- B. & R. Granite Quarry Co.,**
Beebe, Que.
- Brodie's Limited,**
128 Bleury Street, Montreal.
- Joseph Brunet,**
663 Côte des Neiges Road, Montreal.
- La Carrière Bussière Limitée,**
St. Sébastien, Que.
- La Cité de Grand'Mère,**
Grand'Mère, Que.
- Jos. Cloutier,**
Beebe, Que.
- Adolphe Crête,**
Shawinigan Falls, Que.
- Augustin Delisle,**
Rivière-à-Pierre, Que.
- Albert Desrosiers,**
Beebe Jet., Que.

- Arthur Dumas Cie, Enrg.,**
Rivière-à-Pierre, Que.
- William Duncan,**
Graniteville, Que.
- J. C. Lacasse,**
Beebe, Que.
- Alphonse Lacroix,**
St. Sébastien Station, Que.
- James McKenzie,**
Graniteville, Que.
- Robert McIntosh,**
Beebe, Que.
- Pierre Moreau,**
Roberval, Que.
- Mountain Granite Co.,**
Beebe, Que.
- Philippe Nadeau,**
St. Samuel, Que.
- S. B. Norton,**
Beebe, Que.
- Arthur Perron,**
Rivière-à-Pierre, Que.
- Rigaud Granite Quarries Ltd.,**
Rigaud, Que.
- Scotstown Granite Corporation,**
Scotstown, Que.
- Silver Granite Company, Limited,**
St. Samuel Station, Que.
- Stanstead Granite Quarries Co., Limited,**
Beebe Jet., Stanstead Co., Que.
- Vachon, Rodrigue & Frère,**
St. Samuel Station, Que.
- F. Voyer & Frère,**
Rivière-à-Pierre, Que.
- Westmount Construction Co. Ltd.,**
Brownsburg, Que.

LIME

- Arnaud & Beaudry,**
Joliette, Que.
- Adolphe Barron,**
St. Dominique, Bagot Co., Que.
- Delphis Beauregard,**
North Stukely, Que.
- Arthur Boivin,**
Pont Rouge, Portneuf Co., Que.
- Moise Bousquet,**
St. Dominique, Bagot Co., Que.
- R. B. Carswell,**
Bryson, Que.
- Dominion Lime Co.,**
Sherbrooke, Que.
- Octave Fortin,**
Val-Briant, Que.
- Héon & Héon Compagnie,**
St. Louis de Franco, Champlain Co., Que.
- Barthelemy Juteau,**
Ste. Thérèse de Blainville, Que.

- Joseph Lalumière,**
St. Dominique, Bagot Co., Que.
- Nap. Lamothe,**
Pointe-aux-Trembles, Portneuf Co., Que.
- The Laurentian Stone Co., Ltd.,**
Hull, Que.
- Magloire Leclerc,**
St. Dominique, Que.
- Limoges & Cie.,**
40 Poupert St., Montreal.
- Thos. McCambly,**
Kazubazua, Que.
- Montreal Lime Co.,**
31 Prenoveau St., Montreal.
- Francis Naud,**
St. Marc des Carrières, Que.
- Oblats M. I.,**
Maniwaki, Que.
- Paul Roy,**
1460 Cadieux St., Montreal.
- Placide Sanche,**
Ste. Thérèse, Que.
- Standard Lime Co., Limited,**
St. Paul, Joliette Co., Que.
- Stinson-Reeb Builder's Supply Co.,**
45 St. Alexander St., Montreal.
- St. Maurice Lime Company, Limited,**
P. O. Box 479, Trois Rivières, Que.

LIMESTONE

- P. Baillargeon,**
St. John, Que.
- J. W. Baker,**
Chateau Richer, Que.
- Bathurst Company, Ltd.,**
Port Daniel, Que.
- Pitro Beaudry,**
rue Taché, Joliette, Que.
- Solomon Bédard,**
St. Ignace, Que.
- Canada Carbide Company, Limited,**
Power Building, Montreal.
- Carrière de Québec, Ltée,**
Beauport, Que.
- La Cité de Valleyfield,**
Valleyfield, Que.
- La Cité de Hull,**
Hull, Que.
- Consolidated Crushed Rock, Ltd.,**
3656 Masson St., Montreal.
- Alderic Cousineau,**
2455, St. Urbain Street, Montreal.
- The Delorimier Quarry Co.,**
1952 Iberville St., Montreal.
- F. X. Deraiche,**
Port Daniel, Est, Que.
- Deschambault Quarry Corporation,**
52 St. Paul St., Quebec City.

- The Deschambault Stone Co., Limited,**
St. Marc des Carrières, Que.
- Arthur Dupré,**
1237 Des Erables St., Montreal.
- Cyrille Durocher,**
5383 Notre Dame St. East, Montreal, Que.
- Arthur C. Dussault,**
St. Marc des Carrières, Que.
- Alphonse Faubert,**
Ville de Léry, Chateauguay Co., P. Q.
- Adélar Filion,**
Lachûte, Que.
- Georges Fleury,**
Charlesbourg Ouest, Que.
- Martin Gagnon,**
3595 St. Hubert St., Montreal.
- Gaspesian Fertilizer Co., Reg.,**
Port Daniel East, Que.
- Olivier Gauthier,**
St. Marc des Carrières, Que.
- Gingras Frères, Limitée,**
St. Marc des Carrières, Que.
- E. L. Gravel,**
Chateau Richer, Que.
- Institution des Sourds-Muets,**
3600 St. Lawrence St., Montreal.
- The Kennedy Construction Co., Limited,**
310 Shaughnessy Bldg., Montreal.
- Lapierre & Théoret,**
Valleyfield, Que.
- H. & E. Lapointe,**
St. Dominique, Que.
- Joseph Lapointe,**
74 Montée St. Laurent, Cartierville, Que.
- Laval Quarry Company, Ltd.,**
Cap St. Martin, Que.
- D. O. Laviolette,**
166 Montcalm St., Hull, Que.
- Edgar Lawrence,**
Port Daniel, Que.
- Victor Lecrenier,**
3295 DeGaspé St., Montreal.
- John Lowe,**
Valleyfield, Que.
- Maisonneuve Park Commission,**
City Hall, Montreal.
- Maisonneuve Quarry Co., Limited,**
2855 Boulevard Rosemont, Montreal.
- O. Martineau & Fils, Limited,**
371 Marie Anne Ave. East, Montreal.
- R. H. Miner & Co., Ltd.,**
Suite 2—207 St. James St., Montreal.
- Montreal Crushed Stone Co., Ltd.,**
590 Union Ave., Montreal.
- Naud & Darveau,**
St. Marc des Carrières, Que.
- O'Connors Brothers,**
Huntingdon, Que.

- Joseph Pagé,**
Charlesbourg Ouest, Que.
- F. X. Pageau,**
Charlesbourg Village, Que.
- Lévi Paquette & Cie,**
Cap St. Martin, P. Q.
- Damien Paquette,**
Village Bélanger, Laval Co., P. Q.
- Jos. Poulin,**
Chateau Richer, Que.
- John Quinlan & Co.,**
1165 Greene Ave., Westmount, Que.
- Rogers Quarry Company,**
1701 Iberville Street, Montreal.
- A. Simard,**
Chambly, Que.
- The St. Laurent Quarry. Limited,**
Cap St. Martin, Laval Co., Que.
- Séminaire de Joliette,**
Joliette, Que.
- Standard Lime Co., Limited,**
Joliette, Que.
- Stone and Quarry Limited,**
800 Bellechasse St., Montreal.
- Magloire Théoret,**
Valleyfield, Que.
- Moïse Therrien,**
Village Bélanger, Laval Co., Que.
- Napoléon Tremblay,**
Joffre Avenue, Hull, Que.
- Elzéar Verrault,**
191 rue du Pont, Québec.
- Villeray Cut Stone, Limited,**
845 du Rosaire St., Montreal.
- Villeray Quarry Co., Limited,**
848 du Rosaire St., Montreal.
- Hector Vinet,**
4614 Notre Dame East, Montreal.
- Wright & Company, Incorporated,**
Hull, Que.

MARBLE

- The British Canadian Marble Co., Ltd.,**
St. Joseph de Beauce, Que.
- Le Marbre National, Ltée,**
L'Annonciation, Que.
- Wallace Sandstone Quarries, Ltd.,**
Philipsburg, Que.
- White Grit Co.,**
171 Waller St., Ottawa.

POTTERY

- W. & D. Bell,**
1286 St. Valier St., Quebec City.
- Canada Firebrick Co., Ltd.,**
371 Aqueduc St., Montreal.

- Canadian Potteries, Limited,**
St. John's, Que.
Citadel Brick & Paving Block Co., Ltd.,
Quebec City.
La Compagnie de Tuyaux de Drainage Ltée,
L'Islet Station, Que.

SAND

- Arthur Bédard,**
Pont Rouge, Que.
J. A. Benoit,
Mont St. Grégoire, Iberville Co., Que.
Emile Bérard,
Mont St. Grégoire, Iberville Co., Que.
Jos. Blais, Enrg.,
8 Mont Marie Ave., Lévis, Que.
Robert Boa,
Lachute, Que.
Bonnar Sand and Ballast Limited,
South Durham, Que.
Wm. Breault,
16, 1st Ave. South, Sherbrooke,
F. X. Breault,
St. Dominique, Bagot Co., Que.
A. Brouillet Sand and Gravel Co.,
Rawdon, Que.
Canadian National Railways,
Canadian Pacific Railway,
Charles Cartier, P. N.,
St. Romuald, Lévis Co., Que.
Ed. Cauchon,
140, 2d Ave., Quebec City.
Jos. Chamberland,
St. Pierre de Charlesbourg, Que.
The City of Montreal,
City Hall, Montreal.
The City of Sherbrooke,
City Hall, Sherbrooke.
La Compagnie Nolin, Enrg.,
310 Dorchester St., Quebec City.
Consolidated Sand Company,
270 Ottawa St., Montreal.
François Demers,
St. Romuald, Lévis Co., Que.
J. B. Dionne,
Coaticook, Que.
Dominion Sand and Stone Co., Ltd.,
South Durham, Que.
J. A. Dufresne & Cie,
Shawinigan Falls, Que.
Estate A. B. Hart,
Three Rivers, Que.
La Fonderie Suprême Limitée,
Pont Rouge, Que.
Wm. Fraser,
Dorval, Que.
Trefflé Gauthier,
Jonquières, Que.

- Victor Giguère,**
73, 5th Ave., Quebec City.
- Euclide Gosselin,**
Ascot Corner, Que.
- Laurentide Co. Limited,**
Grand'Mère, Que.
- Laurentide Sand and Gravel Ltd.,**
Quebec City,
- Delphis Lazure,**
Mont St. Grégoire, Iberville Co., Que.
- Hormisdas Léonard,**
St. Vincent de Paul, Que.
- Wm. MacNeil,**
West Brome, Que.
- Henri Mailloux,**
Mont St. Grégoire, Iberville Co., Que.
- J. T. A. Melançon,**
Grand'Mère, Que.
- Esdras Métras,**
Mont St. Grégoire, Iberville Co., Que.
- Pierre Philippe Parent,**
Lorctteville, Que.
- Luc Poulin,**
Mont St. Grégoire, Iberville Co., Que.
- Quebec Central Railway Company,**
Sherbrooke, Que.
- The Quebec Montreal and Southern Ry. Co.,**
Montreal, Que.
- Quebec Harbour Commission,**
Quebec City.
- Quebec Sand and Trading Company, Limited,**
71 St. Peter Street, Quebec City.
- Laurent Raymond,**
140 Brooks St., Sherbrooke.
- Emile Robitaille,**
St. Dominique, Bagot Co., Que.
- Sand and Gravel Products Ltd.,**
127 Stanley St., Montreal.
- Cyrille Savard,**
Loretteville, Que.
- Sorel Sand Co. Ltd.,**
Sorel, Que.
- Standard Sand Limited,**
Joliette, Que.
- St. Félix Sand and Gravel Co.,**
Joliette, Que.
- J. David Turgeon,**
70 Wolfe St., Levis, Que.
- Edouard Vézina,**
St. Joseph de Lévis, Que.
- Louis Verret,**
Lac St. Charles, Que.
- Wright & Company Incorporated,**
250 Catherine St., Ottawa.
- Dominion Sanitary Pottery Co., Ltd.,**
St. Johns, Que.
- G. H. Farrar,**
Iberville, Que.

David T. Hodgins,
Shawville, Que.
Montreal Terra-Cotta Co., Ltd.,
511 St. Catherine St. West, Montreal.
Standard Clay Products, Limited,
St. John's, Que.

SANDSTONE

Jos. Blais, Enrg.,
8 Mont Marie Ave., Lévis.
La Cité de Sherbrooke,
Sherbrooke, Que.
Louis Philippe Gagnon,
St. David de Lévis.
Adolphe Paquet,
St. David de Lévis, Que.
Quebec Harbour Commission,
Quebec.
The Kennedy Construction Co. Ltd.,
137 McGill St., Montreal.
E. T. Rousseau, Ltée,
48, Second Avenue, Quebec city, Que.
H. F. Routhly,
Halcybury, Ont.
Silico, Limited,
103 St. François Xavier St., Montreal.
The Sydney Kirby Co., Ltd.,
213 Sussex St., Ottawa.
Jos. Vézina, Enrg.,
St. Louis road, Ste. Foye, Que.

SLATE

The British Canadian Marble Company, Ltd.,
St. Joseph de Beauce, Que.
Canada Slate Corporation,
St. Anselme, Dorchester Co., Que.
New Rockland Slate Co.,
Room 501, Southam Bldg., 128 Bleury St., Montreal.
Slate Products Co. of Canada Ltd.,
Room 501, Southam Bldg., Montreal.

STATISTICS OF ACCIDENTS

REPORTED FROM THE MINES AND QUARRIES DURING THE YEAR 1924

(A. O. Dufresne)

The table published on page 8 in the general report on the mining operations this year shows a decrease in the mineral production in the Province of Quebec. Activity having been less, it followed that a smaller number of workmen were employed in the mines and quarries.

If the year 1924 has not been as profitable to the miners and quarrymen as the preceding year nevertheless it has been a better year than 1922 as shown in the following table:

TABLE I

Workmen employed in mines and quarries

	1924	1923	1922	1921
Number of men employed.....	8,270	8,925	7,808	6,616
Number of men on a 300-day basis...	6,474	7,123	5,885	4,773

From reports sent in by operators it is estimated that 8,270 persons have been employed in the mines and quarries during 1924, as compared with 8,925 for 1923. This is a decrease of seven per cent.

These workmen received in wages, \$7,581,481 an amount slightly inferior to the sum of \$7,608,582 paid during 1923. Of these amounts the miners received \$3,915,506, and the quarrymen \$3,665,975, which compare respectively with \$3,863,495 and \$3,745,087 for the previous year.

TABLE II

Persons employed in the Mines, Quarries and annexed Plants in the Province of Quebec, during 1924

Mines, Quarries and Plants	Number of men employed	Number of men calculated on 300-days basis	
		1924	1923
Asbestos (quarries and mills).....	2,399	2,109	2,852
Copper and Pyrite.....	87	101	62
Chrome (mines and mills).....	.....	.....	20
Feldspar, kaolin (mines and mills).....	166	118	87
Gold and silver.....	367	304	101
Graphite, mica, phosphate.....	240	130	102
Magnesite, dolomite.....	99	48	61
Mineral paints, ochre (pits and mills).....	42	26	47
Molybdenite.....	25	15	1
Quartz and silica rock (quarries and mills)...	59	44	32
Talc.....	21	16	13
Titaniferous iron ore, zinc and lead.....	207	105	68
Brick, pottery, (clay pits and plants).....	1,036	764	1,007
Cement (quarries and plants).....	593	655	839
Granite (quarries and works).....	356	255	339
Lime (quarries and kilns).....	252	234	137
Limestone (quarries and dressing works).....	1,609	1,110	1,032
Marble, slate, sandstone (quarries and works)...	327	162	169
Sand (pit and river sand).....	382	278	152
	8,270	6,474	7,123

TABLE III

	Number of workmen	Wages	Number of day's work	Number of 300-day workers
Producing mines.....	3,298	\$3,430,467	790,029	2,699
Non-producing mines	417	485,039	94,980	317
Total.....	3,715	\$3,915,506	885,009	3,016

TABLE IV

Workmen	Number 300-day workers	Accidents		Total	per 1,000 300-day workers
		Fatal	Non-fatal		
Mines.....	3,016	9	221	230	71.2
Quarries.....	3,458	3	72	75	21.6
Totals.....	6,474	12	293	305	47.3

The average wage earned by a-300-day workman during 1924 was \$1,171; when for the preceding year it was \$1,068. This increase is partly due to higher wages paid by companies engaged in the development of mining properties in Northwestern Quebec.

To get a right conception of the work accomplished in the mineral industry it is necessary to have a uniform basis of comparison. To this end the Bureau of Mines has adopted, for the last ten years, the reduction of the number of workmen to a basis of a full year of 300 working days. To find out the number of such 300-day men represented by the 8,270 persons employed during the most active season of the year, one has simply to add the number of working days performed by the workmen at each mine or quarry and to divide the result by 300. For the year 1924 the quotient is 6,474.

In table II a notable increase in the number of miners employed is shown in metal mines proper: as copper, zinc, lead, gold, titaniferous iron and molybdenite mines. Beside a general improvement in the metal market, the development work carried on in the recently discovered mineral deposits of the region of Abitibi and Temiscamingue counties has largely contributed to this increase. Amongst the non-metallic substances showing an increase are feldspar, graphite, mica, silica and talc; on the other hand there is a strong reduction in the number of men employed in the asbestos, magnesite, kaolin and mineral paint works. Of the building materials indicating increases are limestone, lime and sand; the others show a decrease.

The number of 300-day men at work at the mines was 3,016, and at the quarries 2,458. This is a decrease in labour of twelve per cent and six per cent respectively.

The mine and quarry operators have sent to the Bureau of Mines, during the past year notices for 305 serious accidents entailing loss of time of ten days or more. As represented on table IV, the accident average is 47.3 per 1,000 men, which is slightly higher than for 1923.

TABLE V

Accidents in Mines, Quarries and annexed Plants in the Province of Quebec, during 1924

	Fatal		Non-fatal		Totals	
	No.	%	No.	%	No.	%
MINES:						
Underground.....	2	0.66	19	6.23	21	6.89
Open pits.....	5	1.64	124	40.66	129	42.30
Surface.....	.....	.....	31	10.16	31	10.16
	7	2.30	174	57.05	181	59.35
QUARRIES:						
In pits.....	2	0.65	51	16.72	53	17.37
Surface.....	.....	.....	10	3.28	10	3.28
	2	0.65	61	20.00	63	20.65
ANNEXED PLANTS:						
Concentrators....	3	0.98	48	15.74	51	16.72
Shops.....	.....	.....	7	2.30	7	2.30
Warehouse.....	.....	.....	3	0.98	3	0.98
	3	0.98	58	19.02	61	20.00
Totals.....	12	3.94	293	96.07	305	100%

TABLE VI

Analysis of fatal accidents in Mines, Quarries and annexed Plants in the Province of Quebec for 1924.

Causes of accidents		Under-ground	Open Pits	Surface	Total	
					No.	%
MINES:						
Falls of rock.....		1	5	.....	6	85.7
Hoisting.....		1	.....	.....	1	14.3
		2	5	.....	7	100%
QUARRIES:						
Falls of ground.....		.....	1	.....	1	50.0
Explosives.....		.....	1	.....	1	50.0
		.....	2	.....	2	100%
ANNEXED PLANTS:						
		Concentrators	Repair Shops	Warehouses	Total	
					No.	%
Falls of rock.....		1	.....	.....	1	33.3
Falls of object.....		1	.....	.....	1	33.3
Shafting.....		1	.....	.....	1	33.4
		3	.....	.....	3	100%

TABLE VII

Analysis of non-fatal accidents in Mines, Quarries and annexed Plants in the Province of Quebec, during 1924

Causes of Accidents	Under-ground	Open-pits	Surface	Total	
				No.	%
MINES:					
Falls and slides of ground..	7	45	....	52	29.9
Cable-derricks.....	....	42	2	44	25.3
Haulage.....	5	4	8	17	9.8
Falls.....	....	5	9	14	8.0
Drilling.....	3	7	....	10	5.7
Locomotive cranes.....	....	8	....	8	4.6
Falls of object.....	....	1	5	6	3.4
Miscellaneous.....	2	1	2	5	2.9
Steam shovels.....	....	4	....	4	2.3
Explosives.....	....	4	....	4	2.3
Machinery and tools.....	....	....	3	3	1.7
Derricks.....	....	2	1	3	1.7
Hoisting.....	2	....	....	2	1.2
Hammering stones.....	....	1	....	1	0.6
Aerial tramway.....	....	....	1	1	0.6
	19	124	31	174	100%
QUARRIES:					
Falls and slides of ground..	....	22	1	23	37.7
Haulage.....	....	6	5	11	18.0
Hammering stones.....	....	8	....	8	13.1
Derricks.....	....	1	3	4	6.6
Miscellaneous.....	....	4	....	4	6.6
Explosives.....	....	3	....	3	4.9
Steamshovels.....	....	2	....	2	3.3
Drilling.....	....	2	....	2	3.3
Machinery and tools.....	....	1	1	2	3.3
Falls of object.....	....	1	....	1	1.6
Falls.....	....	1	....	1	1.6
	....	51	10	61	100%
ANNEXED PLANTS:					
	Concen-trators	Repair Shops	Ware-houses	Total	
				No.	%
Machinery.....	13	1	....	14	24.2
Falls of object.....	7	4	....	11	18.9
Bagging and handling bags	7	....	4	11	18.9
Falls.....	3	2	....	5	8.6
Falls of rock.....	5	....	....	5	8.6
Gearing and shafting.....	4	....	....	4	6.9
Miscellaneous.....	4	....	....	4	6.9
Tools.....	2	....	....	2	3.5
Cobbing.....	2	....	....	2	3.5
	47	7	4	58	100%

There were twelve violent deaths in the mines and quarries during the year 1924, being an average of 1.83 per 1,000 men-year. This index number was 3.36, 2.51, 2.72 and 2.38 for 1920, 1921, 1922 and 1923 respectively. In the mines proper the proportion of fatal accidents was 2.98 and in the quarries, 0.86.

The tables which accompany this report have been prepared with a view to inform operators, their superintendents and foremen. They will find in these useful information on the most frequent causes of accidents. However, operators are to be reminded that these tables are valuable in so far as they themselves faithfully conform to the law and give notice to the Bureau of Mines of all serious accidents, which are those entailing incapacity to work for ten days or more. These notices must also contain a complete description of the accident so as to allow proper classification as to cause.

The analyses of accidents as to cause, as presented in tables VI and VII do not indicate any noticeable changes with past year: the same causes are repeated, with frequency averaging the same. Operators who have at heart the safety of their men will know from these tables the principal causes of accidents, and they will apply themselves to protect their employees. In that part of the annual reports for previous years which deals with the statistics of accidents they will find numerous recommendations as to precautions to be taken to better protect their workmen.

Since April 17th 1924, by order of the Lieutenant-Governor in Council, regulations for the safety of mine shaft operations have been enacted. It is now ruled that shafts 100 feet or more in depth must be divided into two compartments, one to be exclusively used as a passage-way. The regulations set the length of pannels of ladders, their inclination, the space between the rungs, etc.; it established the principle of the double exit from underground workings; it provides for the construction of fences, around shaft openings, of safety apparatus for cages and hoisting machinery; it makes compulsory a code of mine signals with signalling apparatus; and it indicates the means to be taken to insure safety for miners during the process of shaft sinking.

FATAL ACCIDENTS DURING THE YEAR 1924 IN MINES, QUARRIES AND ANNEXED BUILDINGS IN THE PROVINCE OF QUEBEC

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
1	Jan. 30	Canada Cement Company Ltd.....	Albert Desormeault ...	44	Labourer	Buried under slide in storage bin. Death by suffocation. Deceased was shovelling stone around the edges of the bin. The stone was frozen together and thawing at the time. He was wearing safety belt and the rope hitched around a beam, another man being in charge to pay out slack as required. He called for too much rope. He went down on a slide and was being pulled out when a second slide occurred, cutting the rope and burying the man.
2	Feb. 9	Gravel pit operation	John Jea Forrester....	26	Labourer	Met a sudden death in a shallow gravel pit near Staynerville. The deceased was loading gravel from the base of a overhanging gravel bank six feet high, when the upper layer which was in a frozen condition fell and buried him. Death due to shock rather than to suffocation.
3	Feb. 19	Robertsonville Soapstone Quarry...	Devini Fillion.....	20	Labourer.....	Was struck on the head by a stone which rolled down a talus.
4	Mch 25	Canadian Johns-Mauville Co., Ltd..	Thomas Watts.....	24	Driller.....	Numerous abrasions on face, hands, left leg and back. Incised wound on head and internal injuries. While at work drilling, a large piece of rock above him near the top of the pit wall fell down bringing with it some frozen earth. Two large pieces of this frozen earth struck Watts, injuring him fatally.
5	Apr. 28	Consolidated Asbestos Limited	Hervé Lafrance.....	27	Shoveller.....	Lafrance was occupied in setting up a machine tripod preparatory to drilling on a bench on the side of of glory-hole. Ore was being shovelled down an adjacent glory-hole some 60 feet distant, a pillar of ground separating the two working places. A piece of rock in its flight down the side of this glory-hole broke into pieces, one of these jumping the pillar and striking Lafrance on the head, knocking him down. He rolled to the bottom of the glory-hole and was killed instantly.

FATAL ACCIDENTS DURING THE YEAR 1924 IN MINES, QUARRIES AND ANNEXED BUILDINGS IN THE PROVINCE OF QUEBEC—Continued

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
6	June 5	O. Martineau & Fils, Ltée.....	Ernest Beaulieu.....	45	Quarryman.....	He was holding in his hands a box containing a few sticks of dynamite, when noticing some fire in the box, he threw it on the quarry, floor. It exploded immediately, killing him and injuring a fellow worker standing nearby.
7	June 16	Quebec Asbestos Corporation Ltd..	Onephas Lessard.....	35	Oiler.....	While oiling a shaft in motion in dryer house, he was caught by the shaft and carried around and finally hurled to the floor. He succumbed to his injuries.
8	July 19	Asbestos Corp. of Canada, Ltd.	Philias Lacroix.....	18	Loader.....	Victim was loading stone in boxes when a rock weighing about 800 lbs. fell from side of pit and struck injured on the head from which injuries he died six hours after.
9	July 19	Asbestos Corp. of Canada, Ltd.	Oliva Poitras.....	28	Labourer.....	Same accident. Was killed instantly.
10	Aug. 10	Stabell Gold Mines Ltd.....	Duncan J. Kennedy...	45	.....	Fractured skull and bones, and presumably internal injuries. Kennedy was coming up a shaft in a bucket when for some unknown reason after proceeding to a height of 150 to 200 feet up the shaft, the bucket began to swing. He fell from the bucket to the bottom of the shaft and was killed instantly.
11	Sept. 3	Asbestos Corp. of Canada, Ltd.	Pierre Rouleau.....	44	Conveyor man...	Was hit by a heavy piece of timber in conveyor room.
12	Nov. 25	Asbestos Corp. of Canada, Ltd.	Joseph Doyon.....	40	Loader.....	Was struck on the head by stones which fractured his skull.

NON-FATAL ACCIDENTS DURING THE YEAR 1924
IN MINES, QUARRIES AND ANNEXED BUILDINGS IN THE PROVINCE OF QUEBEC

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
1	Jan. 2	Consolidated Asbestos Limited.	Roméo Grondin.	18	Shoveller.	Left leg bruised below knee. While coupling cars underground, he had his leg caught between two cars.
2	Jan. 2	Canadian Johns-Manville Co. Ltd. . . .	Henry Piché. ....	...	Labourer.	Fracture along outer side of left patella, extravasation of fluid into knee joint. While loading wood on locomotive, his foot slipped and he fell, hitting knee cap on a piece of wood.
3	Jan. 3	Canadian Johns-Manville Co., Ltd. . . .	Aldeas Chauvin. ....	...	Brakeman.	Contusion of left wrist. Victim stepped in between two cars to turn air unto one car, after which he started to give a car a push; his foot slipped and his hand came down between arm to open car and end of car.
4	Jan. 8	Keasbey & Mattison Company.	Henri Boudreau.	26	Labourer.	Contusions to the right leg. Injured was loading boxes near the jam, when a rock rolled down and struck him.
5	Jan. 9	John Quinlan & Co.	Antonio Bayard.	17	Labourer.	Leg fractured above knee. Victim was sitting on stone which was being moved on a sled from one part of the quarry to another, while rounding a curve the sled overturned and stone rolled over his leg.
6	Jan. 12	Consolidated Asbestos Limited.	Sylvio Drouin.	26	Carter.	Left ankle bruised. While hauling clay, his horse slipped and accidentally kicked him.
7	Jan. 12	Canadian Johns-Manville Co., Ltd. . . .	C. D. Findlay. ....	...	Brakeman.	Inner side of right knee sprained. Coming in the locomotive house which was dark and full of steam, he walked too near the edge of the pit and slipped in.
8	Jan. 16	Asbestos Corp. of Canada, Ltd.	Alfred Levasseur.	38	Brakeman.	Right shoulder sprained, while pushing a car.
9	Jan. 17	Asbestos Corp. of Canada, Ltd.	Désiré Langlois.	36	Loader.	Pain at the right leg and foot. A rock rolled from a jam and struck him.
10	Jan. 17	Asbestos Corp. of Canada, Ltd.	Eugnio Medardi.	46	Loader.	Cut on forehead. A piece of ice stuck on bottom of box came down and struck him.
11	Jan. 18	Consolidated Asbestos Limited.	Léo Breton.	22	Shoveller.	Left foot sprained. While loading cars at chute, a rolling rock struck him.
12	Jan. 19	Asbestos Corp. of Canada, Ltd.	Albert Mayhot. ....	..	Driller.	Thumb nail of left hand pulled off. For moving a rock, he struck the wall.

NON-FATAL ACCIDENTS DURING THE YEAR 1924
IN MINES, QUARRIES AND ANNEXED BUILDINGS IN THE PROVINCE OF QUEBEC

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
13	Jan. 13	Asbestos Corp. of Canada Ltd.....	George Lacroix.....	46	Loader.....	Cut on left hand wrist. In putting a stone into box, it slipped.
14	Jan. 23	Consolidated Asbestos Limited.....	Florian Poulin.....	18	Shoveller.....	Left foot fractured at ankle joint. While cleaning inside of a chute, a rock rolled down and struck his foot.
15	Jan. 23	Asbestos Corp. of Canada, Ltd.....	Ulric Nolet.....	33	Loader.....	A cut at the second left finger. Struck by a stone while loading a box.
16	Jan. 24	Consolidated Asbestos Limited.....	John Kesiluk.....	53	Shoveller.....	Left leg bruised below knee. While shovelling at one of the glory-holes, a rock rolled down from the jam and struck his leg.
17	Jan. 24	Asbestos Corp. of Canada, Ltd.....	Aimé Pelletier.....	40	Labourer.....	Right leg bruised. Struck by a box while helping to place it.
18	Jan. 31	Quebec Asbestos Corporation.....	Alexandre Perreault.....	.....	Labourer.....	Right leg fractured at ankle. Was trying to chain a rock to move it aside with shovel block when a loose rock a little higher up suddenly slid and caught his leg.
19	Jan. 31	Standard Lime Company Limited....	Stanislas Froment.....	40	Labourer.....	Right leg fractured. Was struck by a wrench handle while a fellow worker was unrolling rope to tie same on cars to be pulled forward.
20	Feb. 8	Asbestos Corp. of Canada, Ltd.....	Edouard Hébert.....	30	Millhand.....	Right foot bruised. While repairing conveyor on sand dump he had his foot caught between conveyor and conveyor-roller.
21	Feb. 8	Federal Asbestos Company.....	Adolphe Vaehon.....	28	Labourer.....	Face and hands severely burned and incised wounds, by the explosion of a fuse he was using to fire dynamite shots.
22	Feb. 8	Consolidated Asbestos Limited.....	Augustin Jacques.....	36	Oiler.....	Severe wound on back of head, face and right arm bruised, nose fractured. While applying belt dressing to head drum of conveyor in motion, the belt suddenly gripped and drew his right arm in between the belt and drum.
23	Feb. 11	Canadian Johns-Manville Co., Ltd..	Donat Provencher.....	.....	Millhand.....	Contusion and abrasion of skin and right ankle. A large rock lying at top of slip feeding into crushers was dislodged and in coming down the slip made some smaller rocks fly around. One of these fell on victims' foot.

24	Feb.	11	Asbestos Corp. of Canada, Ltd.	Rosaire Giroux	23	Driller	Left knee and right leg bruised. The injured was drilling a block hole on a rock when same rolled over catching his legs between rocks.
25	Feb.	12	Keasbey & Mattison Company	N. Simard, Jr.	22	Drill helper	Right thumb badly bruised. He was lifting a drill when it suddenly started to run. Left foot sprained.
26	Feb.	13	Consolidated Asbestos Limited	Josephat Martel	47	Oiler	Left foot sprained. Fell off conveyor.
27	Feb.	13	Consolidated Asbestos Limited	Liboire Racine	25	Driller	Left wrist sprained. While barring loose rocks, a rock struck his bar.
28	Feb.	14	Keasbey & Mattison Company	Jean Hébert	44	Labourer	Third joint of small finger of right hand amputated. Injured was rolling a big rock in a box when he had his finger caught between two rocks and badly bruised.
28	Feb.	14	Canadian Johns-Manville Co., Ltd.	D. Mercier		Labourer	Contusion and abrasion of skin right instep and ankle right foot. While erecting steel trestle work, bents being pulled by team into position slipped suddenly and victim got his foot pinched between.
30	Feb.	15	Asbestos Corp. of Canada, Ltd.	Mike Bodnar	45	Loader	Left hand wounded. Had his hand caught between a stone and a chain while moving that stone.
31	Feb.	16	Asbestos Corp. of Canada, Ltd.	Jos. Bilodeau	24	Machinist helper	First right finger bruised. Caught between two rolls while repairing a sheet of steel.
32	Feb.	18	Asbestos Corp. of Canada, Ltd.	Léo Giguère	24	Millhand	Sprained his back when lifting bags in mill.
33	Feb.	19	Canadian Johns-Manville Co., Ltd.	Ed. Poisson		Brakeman	Contusion of left knee. Fell into a pit in locomotive house which was full of steam so that he could not see his way.
34	Feb.	20	Canadian Johns-Manville Co., Ltd.	Lewis Weagle		Millhand	Severe conjunctivitis. While at bottom of elevator victim happened to look upward and a drop or two fell into his eye, causing inflammation.
35	Feb.	20	Consolidated Asbestos Limited	Arthur Dubuc	20	Oiler	Little finger of left hand cut a second joint. While oiling a grader in motion, he had his finger caught between gears.
36	Feb.	28	Asbestos Corp. of Canada, Limited	Ovide Lessard	53	Loader	Pain at the right side and shoulder. Was struck by a box while helping to move it.
37	Feb.	28	Asbestos Corp. of Canada, Ltd.	Octave Trahan	60	Dumpman	Pain at the right side. While working on dump, he fell and struck his side on a piece of frozen sand.
38	Feb.	29	Keasbey & Mattison Company	Georges Gonthier	17	Dumpman	Right hand badly bruised. Injured was dumping boxes into a car when he got his hand caught between the box and the car.
39	Feb.	29	Canadian Johns-Manville Co., Ltd.	Alph. Belcourt		Brakeman	Contusion of right leg. Victim was riding in cab of locomotive when the latter was hit from behind and coal box came in and pinched his leg.
40	Feb.	1	Canadian Johns-Manville Co., Ltd.	Arthur Roux		Bagger	Third digit left hand infected. Ran needle into finger while sewing up a bag of asbestos.
41	Feb.	7	Keasbey & Mattison Company	J. Parent	47	Labourer	Bruised hip. Injured was loading boxes near the jam when a rock rolled down and struck him.

NON-FATAL ACCIDENTS, 1924.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
42	Mch 12	Consolidated Asbestos Limited.....	George Desrochers.....	24	Bagger.....	Left medium finger infected. While bagging asbestos fibre, some asbestos got in his finger.
43	Mac 15	Keasbey & Mattison Company.....	Louis Vermette.....	47	Labourer.....	Right thumb partly cut off. Injured was loading boxes near the jam when a rock rolled down and struck him.
44	Mch 18	Asbestos Corp. of Canada, Ltd.....	Joseph Lessard, Jr.....	30	Machinist.....	Pain at the right eye. While he was repairing a ball bearing one of the balls jumped out of the ring and struck him at the eye.
45	Mch 19	Consolidated Asbestos Limited.....	Albert Moreau.....	23	Shoveller.....	Left index and medium fingers bruised. A rock fell from a chute and struck his fingers.
46	Mch 19	Keasbey & Mattison Company.....	Octave Guay.....	38	Labourer.....	Cut on the head and slight concussion. Man handling water hose for the crane dropped the nozzle on injured man's head.
47	Mch 19	Canadian Johns-Manville Co., Ltd.....	Hector St. Cyr.....		Bagger.....	Contusion of first digit of left foot. While removing bags from feed spout, bag of rock fell on his foot.
48	Mch 19	Canadian Johns-Manville Co., Ltd.....	Ovila Meunier.....		Labourer.....	Contusion of top of left foot. Iron bar, with which he was unloading heavy casting from car, fell on his foot.
49	Mch 20	Johnson's Company.....	Wm. Minot.....		Labourer.....	Was loading a car with fibre when he fell off the platform and hurt his left shoulder.
50	Mch 21	Consolidated Asbestos Limited.....	Gédéon Bellavance.....	26	Shoveller.....	Left index finger badly bruised. While shovelling a rock fell from the chute and struck his finger.
51	Mch 22	Canadian Johns-Manville Co., Ltd.....	Francis Jutras.....		Bagger.....	Pain in lower left abdomen. Fellow workman put air hose against him and blew air into his rectum.
52	Mch 22	Canadian Johns-Manville Co., Ltd.....	George Vickers.....		Machinist.....	Several abrasions on back of hand and fracture of fourth meta carpal bone. While carrying angle bar on his shoulder victim's foot slipped and he put out hand to save himself, when bar on his shoulder fell off and came down on his foot.
53	Mch 22	Asbestos Corp. of Canada, Ltd.....	P. Lizotte.....	26	Labourer.....	Wounds at left hip and back. Was struck by a stone which fell from jam.
54	Mch 24	Asbestos Corp. of Canada, Ltd.....	Aimé Martineau.....	19	Labourer.....	Annular finger of right hand broken at second joint. While conveying a piece of hardwood plank on his shoulder, he slipped and fell.
55	Mch 25	Consolidated Asbestos Limited.....	Wilfrid Binette.....	21	Shoveller.....	Left knee bruised. While climbing up a raise for blasting, a rock dropped and struck his knee.

56	Mch	25	Consolidated Asbestos Limited.....	Ernest Kirouac.....	26	Brakeman.....	Right foot bruised. When jumping off a car in motion his foot slipped thereby causing him to fall on the track and he had his foot caught between the wheel and the rail.
57	Mch	26	Consolidated Asbestos Limited.....	Fortunat Fecteau.....	19	Shoveller.....	Right hand bruised and infected. Was struck by a stone which rolled down the jam.
58	Mch	27	Keasbey & Mattison Company.....	Damase Gagné.....	42	Labourer.....	Left side of body badly bruised. While running away from a rolling rock, he stumbled and fell on rocks.
59	Mch	27	Canadian Johns-Manville Co., Ltd..	Willie Pruneau.....	.....	Steam shovel....	Sprain of left ankle. In jumping off steam shovel foot board, he landed on a rock and twisted his ankle.
60	Mch	27	O. Martineau & Fils Ltée.....	Ed. Martineau.....	70	Labourer.....	Incised wound at left foot. A steel beam he was sawing slipped and hit his foot.
61	Mch	28	Canadian Johns-Manville Co., Ltd..	Archie Cloutier.....	.....	Millhand.....	Strain of lumbar muscles. Hurt his back while lifting on end of small crusher jaw.
62	Mch	28	Canadian Johns-Manville Co., Ltd..	Apolidore Beauvillier.....	.....	Millhand.....	Deep lacerated wound just below left knee. In coming down office steps victim fell and struck his knee on a rock.
63	Mch	29	Federal Asbestos Co.....	Joseph Jean Parent... 23	Labourer.....	Contusions on his back and on his head. Struck by down coming mine car which he did not hear coming.	
64	Mch	31	Asbestos Corp. of Canada, Ltd.....	Emile Loignon.....	16	Cobber.....	Left thumb bruised, while cobbing crude.
65	Mch	31	Asbestos Corp. of Canada, Ltd.....	Omer Perron.....	17	Cobber.....	Cut at left thumb, while cobbing crude.
66	Mch	31	Asbestos Corp. of Canada, Ltd.....	Ovide Lessard.....	53	Loader.....	Pain at the left knee, struck by a stone which rolled from a jam.
67	Mch	31	Asbestos Corp. of Canada, Ltd.....	J. S. Bouchard.....	32	Foreman.....	Wounds at the right palm, 1st and 2nd fingers. To prevent an accident injured was taking wire off a blasting cap which had missed and it exploded in his hands.
68	Apr.	3	Asbestos Corp. of Canada, Ltd.....	Emile Leblanc.....	30	Loader.....	A cut at the head. A large stone which rolled from a jam broke into pieces and one of them struck Leblanc at the head.
69	Apr.	4	Keasbey & Mattison Company.....	Ernest Perron.....	24	Labourer.....	Little toe of right foot fractured. While loading a box on a lorry, injured got his right foot caught between the rail and a wheel.
70	Apr.	5	Asbestos Corp. of Canada, Ltd.....	Paul Bodnar.....	19	Loader.....	Fracture of external part of the skull. Many wounds to the head and to the face, also deep contusions to the left arm and forearm. A large rock fell from side of pit on steps and split, two pieces striking injured.
71	Apr.	5	Federal Asbestos Co.....	Omer Landry.....	40	Labourer.....	Fracture of the collar bone. While driving a wagon, one wheel slipped into a deep rut causing driver to fall off.

NON-FATAL ACCIDENTS, 1924.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
72	Apr. 5	Canadian Johns-Manville Co., Ltd.	Albert Campbell		Fireman	Abrasion and contusion from middle of shin to ankle of right leg and abrasion of left knee. He was standing in front of steam shovel when a slide of dirt came down and covered his right leg and knocked him down.
73	Apr. 6	Canadian Johns-Manville Co., Ltd.	Clovis Biron		Truckman	Contusion and loss of nail of 1st digit of left foot. While pushing a truck load of bags to mill, he tried to push back in place bags which were falling off, not noticing he placed his foot on the track and one wheel of the truck passed over same.
74	Apr. 6	Consolidated Asbestos Limited	Wilbrod Roberge	28	Foreman	Right foot bruised. While removing gears off a shaft, one of them fell on his foot.
75	Apr. 7	Consolidated Asbestos Limited	Henri Jacques	20	Cleaner	Right eye injured. A small rock got in his eye.
76	Apr. 7	Consolidated Asbestos Limited	Achille Barnabé	19	Contractor	Left shoulder bruised. While loading a cart with clay, a stone rolled down the side of the dump and struck him.
77	Apr. 8	The Dominion Lime Company	Adolf Boisvert	67	Stone breaker	Right hand dislocated. A stone fell striking man's bar, causing it to fall across his wrist.
78	Apr. 14	Asbestos Corp. of Canada, Ltd.	Joseph Lessard, jr.	25	Loader	A cut at the head. Struck by a stone which fell from a jam.
79	Apr. 15	Asbestos Corp. of Canada, Ltd.	Hipolyte Ouellette	23	Loader	Cut of the scalp and fracture of the skull. A stone rolled from a jam and struck him while he was loading a box.
80	Apr. 16	Keasbey & Mattison Company	Joseph Vallée	26	Labourer	First metatarsal of left foot fractured. While lowering a box from a crane's derrick, injured got his foot caught underneath the box.
81	Apr. 16	Maple Leaf Asbestos Cotp., Ltd.	Jean-Bte Gagné	32	Loader	Cut on scalp and bruised side. Injured was running away from a slide on the jam, when he fell.
82	Apr. 22	Federal Asbestos Co.	Théodule Bisson, jr.	29	Driller	Cut in the head. While working in the jam, a rock from the side of the pit fell on his head.
83	Apr. 23	Keasbey & Mattison Company	Arthur Poulin	39	Driller	Severe contusions to the right leg and body. While drilling in the jam, was struck by the rocks rolling down.
84	Apr. 24	Federal Asbestos Co.	Wilfrid Roberge	18	Oiler	Sprained left wrist with deep cut on back of wrist and bruises on left hand and fingers. While oiling a conveyor roll, one defective steel lacing lacerated his left forearm at the wrist.
85	Apr. 26	Brodie's Limited	Armand Ledoux	21	Labourer	Tip of finger crushed and amputated. While handling stones, one piece fell on his finger tip.

86	Apr.	30	Asbestos Corp. of Canada, Ltd.	Jos. Gaudreau	30	Loader	Sprained his back while loading boxes.
87	May	1	O. Martineau & Fils, Ltée.	S. Lalumière	35	Driller	Wounded at his back by stones which fell on him.
88	May	1	National Brick Company	E. Therrien		Labourer	Stone rolled down clay bank in pit, striking workman's foot.
89	May	3	Johnson's Co.	Octave Bernard			Thumb of right hand bruised and subsequently amputated. While pushing on a rock which was being hoisted, he had his thumb caught under the chain which slipped.
90	May	5	Canadian Johns-Manville Co., Ltd.	G. Andrews		Machinist	Sprain of right ankle and partial fracture of lower end of fibula. Victim while pulling on a chain to move crane ahead in machine shop, jumped on a rail on floor and fell.
91	May	5	Maple Leaf Asbestos Corp., Ltd.	Odilon Drouin	36	Labourer	Bruised finger. While shovelling coke in dryer house, he struck his hand against wooden post.
92	May	6	Maple Leaf Asbestos Corp., Ltd.	Adélaré Leblanc	28	Labourer	Bruised side. The injured was holding a scraper pulled by a horse, when the scraper struck a buried rock which caused the handle striking him a violent blow on the side.
93	May	7	Eustis Mining Co.	Herbert Bingham	22	Labourer	Left leg crushed and right foot amputated above ankle. While he was shovelling underground, a rolled down the pile catching him on both legs.
94	May	9	Asbestos Corp. of Canada, Ltd.	Alphonse Lachance	34	Loader	Pain at the left side and right hip. Was struck by a hoisting chain.
95	May	10	Canadian Johns-Manville Co., Ltd.	Joseph Poirier		Yardhand	Contusion of nail and fracture of tarsal bone of 1st digit, left foot. While victim was unloading a car of brick, one fell on his foot.
96	May	12	Consolidated Asbestos Limited	Gédéon Couture	27	Bag piler	Severe pain to the left side. While piling bags of asbestos in a car.
97	May	12	Maple Leaf Asbestos Corp., Ltd.	Elzéar Defont	19	Loader	Bruised leg. Large rock in process of chaining slipped, and swinging chain struck injured man on leg.
98	May	12	Maple Leaf Asbestos Corp., Ltd.	Baptiste Houde, jr.	19	Loader	Left hand bruised. Same accident.
99	May	13	Asbestos Corp. of Canada, Ltd.	François Nolet	50	Carpenter	A large cut at the head. Vibrating screen, which he was moving in the mill, fell and struck his head.
100	May	15	O. Martineau & Fils, Ltée.	J. B. Carrure	45	Stone breaker	Bruised foot. While breaking stone, one piece fell on his foot.
101	May	16	Asbestos Corp. of Canada, Ltd.	Théodore Poulin	48	Loader	Right foot bruised. A stone fell on his foot.
102	May	17	Consolidated Asbestos Limited	Charles Turgeon	35	Bagger	Chest sprained, while lifting bags of asbestos.
103	May	17	Asbestos Corp. of Canada, Ltd.	Philémon Tardif	33	Bagger	Sprained the first finger of his left hand while bagging fibre.
104	May	22	Asbestos Corp. of Canada, Ltd.	Joseph Robert	50	Loader	Pain at the back. Fell on his back while getting away from a stone rolling from a jam.
105	May	22	O. Martineau & Fils, Ltée.	A. Plouffe	32	Stone breaker	Bruised knee, while breaking stone.
106	May	26	Asbestos Corp. of Canada, Ltd.	Joseph St. Laurent	35	Loader	First finger bruised and thumb of right hand fractured by a stone which fell from a box.

NON-FATAL ACCIDENTS, 1924.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
107	May 27	North American Magnesite Producers, Limited.	Gene Rosetto.....	24	Shoveller.....	Fractures of malleolus and of lower end of fibula. A bucket was being lowered onto the pit and he was pulling it into place when his foot slipped and one corner of the bucket came down on his right ankle.
108	May 30	Asbestos Corp. of Canada, Ltd.....	Armand Fontaine.....	17	Loader.....	Pain at the back. Was struck by a box, while keepink to move it.
109	June 4	Stone and Quarry Limited.....	Philibert Charron.....	.....	Labourer.....	Part of right thumb amputated. While unloading stone car, he had his thumb crushed.
110	June 5	O. Martineau & Fils, Ltée.....	A. Brunet.....	25	Stone breaker.....	Injuries and burns at face, by the explosion of dynamite.
111	June 6	Consolidated Asbestos Ltd.....	Philémon Fortin.....	20	Shoveller.....	Left index finger bruised. While loading cars at chute, he had his finger caught between a rock and a rail.
112	June 6	Consolidated Asbestos Limited.....	Willie Dubois.....	19	Oiler.....	Anterior and posterior part of head bruised. While going up a ladder to put conveyor belt in working condition his clothes struck to the shaft, causing him to go around shaft a few turns.
113	June 9	Keasbey & Mattison Company.....	Romuald Fortin.....	49	Labourer.....	Right ankle and left leg severely bruised. Injured was loading boxes near the jam, when a rock rolled down and struck him on both legs.
114	June 9	Keasbey & Mattison Company.....	Pierre Ouellette.....	.....	Labourer.....	Left leg bruised. While lowering his box from the crane, he had his leg caught between two boxes.
115	June 10	Canadian Johns-Manville Co., Ltd..	Antonia Cailler.....	.....	Jackman.....	Contusion of lower left side of patella and effusion of fluid into the joint. While using jack, bar slipped and struck man on knee.
116	June 10	Silver Granite Co., Ltd.....	Ludger Gauthier.....	45	Foreman.....	Wounds at the head. Was struck by a hoisting steel cable which broke.
117	June 10	Silver Granite Co., Ltd.....	Charles Trépanier.....	19	Labourer.....	Four teeth broken. Same accident.
118	June 11	O. Martineau & Fils, Ltée.....	J. McCullough.....	24	Stone breaker.....	Left knee bruised. While loading a truck, he struck his knee on a hub.
119	June 14	Canada Cement Company, Ltd.....	C. Simard.....	55	Quarryman.....	First toe of left foot fractured. Dropped a large stone on foot.
120	June 14	Asbestos Corpor. of Canada, Ltd.....	Cyrille Bisson.....	51	Labourer.....	Right thumb bruised, in coupling card.
121	June 16	L. Deguire Quarry Co.....	J. Belsario.....	.....	Labourer.....	Scalp wound. A piece of rock fell from bucket of steam shovel and struck him on the head.
122	June 18	Canadian Johns-Manville Co. Ltd..	Arthur Campagna.....	.....	Driller.....	Amputation of thumb and of portions of second and third fingers of left hand. Victim endeavored to extract dynamite cap out of unexploded block-hole, when cap partway out exploded.

123	June 18	A. Dupré & Co.	Engène Pelosse	26	Carter	Injuries to one eye. A stone chip flew off and struck his eye.
124	June 23	Asbestos Corp. of Canada, Ltd.	Alphonse Gaudreau	45	Loader	Pain at the right foot bruised, and cut at the head. Was struck by rocks rolling from the jam.
126	June 28	Canadian Wood Molybdenite Co.	John Devenny	60	Mechanic	Thumb of right hand badly crushed. While setting Pittman on crusher, he was holding a plank between Pittman and frame of crusher, when the plank slipped and the crusher dropped back jamming his thumb.
127	June 30	Asbestos Corpor. of Canada, Ltd.	Léonidas Martineau	34	Loader	Pain at the right foot. A stone fell on his foot.
128	June 30	Asbestos Corp. of Canada, Ltd.	Théophile Richard	33	Loader	Right leg fractured. While loading stones in a box, one fell on his leg.
129	July 1	Keasbey & Mattison Company	Auguste Bois	52	Labourer	Compound fracture of left leg. Injured was loading boxes, near the jam when a big rock rolled down and struck him.
130	July 2	The Villeray Quarry Co., Ltd.	Victor Tremblay	35	Stone breaker	Incised wound on forehead. Was standing at foot of stone car elevator when a small piece of rock dropped down and hit him on forehead.
131	July 2	Art. C. Dussault	Delavoie Petit	39	Labourer	Leg bruised, while handling stone.
132	July 3	Wallace Sandstone Quarries Ltd.	Louis Picolli	30	Driller	Fractured skull. While levering his drill into the correct position which was close to the edge of a ledge, his bar slipped causing him to lose his balance and to fall over head first, making a drop of 15 feet on to a pile of broken stone below.
33	July 3	Asbestos Corp. of Canada, Ltd.	Joseph Turcotte	33	Loader	Inflammation of the right eye. A little piece of stone struck his eye.
134	July 3	Asbestos Corp. of Canada, Ltd.	Joseph Langlois	38	Loader	Pain at the neck and right shoulder. While piling asbestos bags, one fell on him.
135	July 3	Canadian Johns-Manville Co., Ltd.	Joseph Lacerte		Millhand	Laceration of left hand and of fingers. In trying to recover shovel caught under edge of elevator bucket, into which he was shovelling spill, he had his fingers caught under sharp edge of bucket.
136	July 4	Asbestos Mines Limited	Gédéon Jacques	43	Foreman	Elbow crushed around articulation. When babbiting a crusher shaft held by two chain blocks, the chain of one of the blocks slipped and Jacques had his arm caught between the shaft and the crusher bearing.
137	July 5	Asbestos Corp. of Canada, Ltd.	Wilfrid Poulin	27	Driller	Second left finger bruised. A part of drill fell on his finger.
138	July 5	Asbestos Corp. of Canada, Ltd.	Lucien Laliberté	18	Loader	Pain at the left side. Was struck by a box in motion.
139	July 7	Consolidated Asbestos Limited	John Canning	33	Electrician	Left foot fractured. While working at the top of a ladder fixing conduit pipes at the shaft house, he slipped and fell off the ladder to the ground.
140	July 9	Asbestos Corp. of Canada, Ltd.	Mastai Fectau	33	Loader	Pain at the left leg. A stone rolled from a jam and struck him.

NON-FATAL ACCIDENTS, 1914.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
141	July 9	Canadian Johns-Manville Co., Ltd.	E. MacGinogal		Machinist	Lacerated wound at the right temple. While making repairs to an engine in machine shop, a bar with which he was working slipped striking victim on side of head.
142	July 14	Asbestos Corp. of Canada, Ltd.	Aimé Lachance	43	Loader	Sprained his back, while loading boxes.
143	July 14	O. Martineau & Fils, Ltée.	P. Beaulieu	25	Stone breaker	Thumb cut, while loading stones in a box.
144	July 15	Montreal Crushed Stone Co., Ltd.	T. Therrien	28	Trackman	Big toe badly crushed. He had his foot caught under rail when moving same into place.
145	July 15	Montreal Crushed Stone Co., Ltd.	A. Trudeau	24	Machinist	Splinter in thumb of left hand followed by infection and boils. A steel splinter penetrated his thumb while he was drilling steef for bucket.
146	July 15	Asbestos Corp. of Canada, Ltd.	Napoléon Vachon	22	Loader	Pain at the abdomen. Was struck by a hoisting chain and hooks.
147	July 18	Asbestos Mines Limited	Apolinaire Drouin	27	Driller's helper	Skin of both hands burnt and broken, with small pieces of rock in the cuts. While loading drill holes, a stick of dynamite holding cap exploded in his hands.
148	July 19	Asbestos Corpor. of Canada, Ltd.	Alfred Létourneau	52	Loader	Pain at the right knee. Was struck by a stone which rolled from a jam.
149	July 19	Keasbey & Mattison Company	Israel Bilodeay	59	Carpenter	Contusions to the lower ribs of the right side. Injured was walking on a square piece of timber about four feet from the ground when he stumbled and fell.
150	July 19	St. Lawrence Brick Co. Ltd.	Jules Lavallée		Labourer	Contusions at the right hand.
151	July 19	St. Lawrence Brick Co., Ltd.	Aimé Daunais		Labourer	Fracture at the right index.
152	July 20	Stabell Gold Mines Ltd.	P. Sitar	30	Miner	Infection of middle finger of right hand. He scratched his finger when handling steel or shovelling in the mine, and the scratch became inflamed and subsequently infected.
153	July 21	Asbestos Corp. of Canada, Ltd.	Ulric Nolet	34	Loader	Pain the right side. He fell and struck his side on a box.
154	July 22	Stabell Gold Mines Ltd.	John Gillis	40	Miner	Infected blister on hand.
155	July 22	Asbestos Corp. of Canada, Ltd.	J. Nadeau	28	Labourer	Left wrist sprained, while lifting stones.
156	July 24	Johnsons' Co.	Robert Mercier		Oiler	First finger of right hand amputated, contusions on the neck. While oiling a hoisting rope in operation, he had his finger caught between the pulley and wire rope. Apparently he slipped against the rope as it made a wound on his neck also.

157	July 24	O. Martineau & Fils, Ltée.....	L. Coya.....	16	Carter.....	Crushed toes. While loading a cart, a stone fell on his right foot.
158	July 26	Eustis Mining Company.....	Robert Sage.....	40	Labourer.....	Concussion, nose torn, several head bruises. He was going underground in riding car, when rail broke letting car jump track throwing injured against wall where he rolled down by car.
159	July 26	North American Magnesite Producers Limited.	Her. Torrenge.....	24	Shoveller.....	Bruises and cut on third finger of right hand which became infected. Had his finger caught under the sharp corner of a rock.
160	July 26	North American Magnesite Producers Ltd.	Angelo Fedesco.....	24	Shoveller.....	Bruises and strain on left ankle joint. Was struck by a rock which fell from a pile.
161	July 28	John Quinlan & Co.....	Joseph Loiseau.....		Mechanic.....	First two fingers of right hand amputated. While placing wedges under a large stone which was being lowered on a truck with the aid of a derrick, he had his fingers crushed under the stone when the grips holding it slipped off.
162	July 28	St. Lawrence Brick Co., Ltd.....	D. Raymond.....			Little toe of right foot fractured.
163	July 30	Adolphe Paquet.....	Adolphe Paquet.....	42	Quarry operator.....	Foot fractured. Was struck by a rolling stone.
164	July 31	Stabell Gold Mines Ltd.....	Lyle Smith.....	17	Cook.....	Cut his foot while chopping wood with an axe.
165	July 31	Keasbey & Mattison Company.....	Phil. Thibeault.....	38	Labourer.....	Fracture of the skull, temporal region, left side. Injured was loading boxes near the jam when rocks rolled down and a splinter struck him on the left temple.
166	July 31	Keasbey & Mattison Company.....	Treffé Lessard.....	30	Labourer.....	Severe contusions to the left leg. While running away from rolling rocks, he stumbled and fell on rocks.
167	July 31	Olivier Gauthier.....	Alcide Lefebvre.....	26	Labourer.....	Toe bruised by fall of a piece of stone he was breaking.
168	Aug. 1	Asbestos Corp. of Canada, Ltd.....	Jos. Lachance.....	22	Loader.....	Third right finger bruised. A rock slipped from his hand and caught his finger.
169	Aug. 2	The Villeray Quarry Co., Ltd.....	D. Dupré.....	34	Stone breaker.....	Leg fractured near ankle, by a stone which fell from the quarry wall.
170	Aug. 2	Asbestos Corp. of Canada, Ltd.....	Alfred Lepage.....	34	Loader.....	Left foot bruised. A stone rolled from jam.
171	Aug. 6	Stabell Gold Mines Ltd.....	Walter Smith.....	24	Driller.....	Hand crushed. He was running a drill in shaft when his assistant moved the nose of the drill, the latter squeezing his hand against the rock.
172	Aug. 7	Canadian Wood Molybdenite Co.....	Clifford G. Hobbs.....	21	Millhand.....	Middle finger fractured, knuckle hurt and slight cuts on hand. Victim was wiping grease off slowly revolving connecting rod and got his hand caught between rod and frame of classifier.
173	Aug. 8	Federal Asbestos Co.....	Jotny Landry.....	45	Labourer.....	Two ribs broken. While grooming a horse, the horse kicked him.
174	Aug. 9	O. Martineau & Fils, Ltée.....	Ed. Bouebard.....	22	Stone breaker.....	Finger of left hand bruised, while handling stones
175	Aug. 9	Maple Leaf Asbestos Corp. Ltd.....	Edouard Labonté.....	33	Labourer.....	Right foot bruised. Injured was shovelling overburden when large rock became loose and rolled down talus, striking his foot.

NON-FATAL ACCIDENTS, 1924.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
176	Aug. 11	Canadian Johns-Manville Co., Ltd.	Charles Jacques	.....	Bagger	First finger of right hand sprained with fracture of metacarpal bone of first finger. While carrying stack of bags, he fell.
177	Aug. 13	Canada Asbestos & Chrome Co.	Arthur Turcotte	30	Labourer	Finger bruised. Caught between two pieces of machinery in mill.
178	Aug. 13	Asbestos Corp. of Canada, Ltd.	Alex. Bauley	33	Loader	Third finger of right hand bruised, by rock rolling from jam.
179	Aug. 14	Asbestos Mines Limited.	Joseph Lefebvre	60	Labourer	End of index finger of left hand torn off at nail root and subsequently amputated. While dumping aerial tramway bucket, his finger was caught between a stine and the side of the bucket.
180	Aug. 14	Asbestos Corp. of Canada, Ltd.	Alfred Mercier	23	Loader	Fourth left finger fractured, while practising baseball on company's time.
181	Aug. 15	Asbestos Corp. of Canada, Ltd.	Arthur Auclair	29	Loader	Back struck by stone rolling from jam.
182	Aug. 15	O. Martineau & Fils, Ltée	A. Naud	21	Fireman	Wounded at right hand, while uncoupling air pipes.
183	Aug. 16	Canadian Johns-Manville Co., Ltd.	Frank Grimard	.....	Brakeman	Extensive lacerations of two fingers of the right hand with amputation of first phalanx of small finger. Hand got caught between draw-bar and frame of car.
184	Aug. 19	Montreal Crushed Stone Co., Ltd.	D. Gagnon	20	Millman	Back of hand badly cut from wrist to knuckles. Injured stopped screen to remove stone jammed at roller, when weight of stone inside caused screen to turn catching his hand between roller and beam.
185	Aug. 23	Keasbey & Mattison Company	Romuald Fortier	49	Labourer	Third finger of left hand bruised, by a rock rolling down jam.
186	Aug. 26	Asbestos Corp. of Canada, Ltd.	Cléophas Dion	43	Loader	Chest injured. Stone fell on bar and injured was hit by same.
187	Aug. 26	Asbestos Corp. of Canada, Ltd.	Alfred Ardouin	29	Loader	Left leg bruised. Rock rolled from jam and struck his leg.
188	Aug. 27	Asbestos Corp. of Canada, Ltd.	Emile Dion	22	Loader	Third left toe fractured. Stone fell on his foot while loading boxes.
189	Aug. 28	Maple Leaf Asbestos Corp. Ltd.	Arthur Paré	26	Labourer	Left collar bone fractured, contusions of legs, hip and shoulder. Injured man was stripping when wall of overburden collapsed, burying him.
190	Aug. 30	Consolidated Asbestos Limited.	Arthur Jolicœur	52	Millhand	Left side of face bruised. While getting a big rok through the grizzly, another rock rolled from the car striking his crowbar.

191	Aug.	30	Asbestos Corp. of Canada, Ltd.	Léonidas Lachance	30	Loader	Left leg bruised. While breaking a rock, a piece struck his leg.
192	Aug.	30	Canada Cement Company, Ltd.	E. Loyer		Labourer	Loss of one eye. A piece of steel flew and hit his eye, when cutting rivets.
193	Sept.	2	Asbestos Corp. of Canada, Ltd.	Gaudias Ardouin	41	Millman	Ruptured himself when placing belt on pulley in mill.
194	Sept.	2	Montreal Crushed Stone Co., Ltd.	A. Major	34	Labourer	Leg bruised at knee. When moving steam shovel angle bar was placed over rail joint. Wheel on opposite side jumped track, causing bar to fly out striking man on leg.
195	Sept.	2	Canadian Johns-Manville Co., Ltd.	Gédéon Boisvert		Machinist	Severe sprain of inter tarsal joints of left foot. Steam shovel chain sheave rolled against victim's foot while he was handling same.
196	Sept.	5	Asbestos Corp. of Canada, Ltd.	Jos. Crépault	38	Loader	A stone fell on his third finger, cutting it.
197	Sept.	5	Asbestos Corp. of Canada, Ltd.	B. Bourgault	39	Loader	Left hip bruised. A rock fell on his crowbar.
198	Sept.	8	Asbestos Corp. of Canada, Ltd.	Désiré Turmel	24	Brakeman	Right thumb bruised, when coupling cars.
199	Sept.	11	Maple Leaf Asbestos Corp., Ltd.	Ph. Boussonneault	22	Bagger	Strained his back while piling asbestos bags.
200	Sept.	12	Gaspeian Fertilizer Co.	John Morin	36	Labourer	Sprained his foot.
201	Sept.	15	O. Martineau & Fils, Ltée.	E. Grenier	31	Carter	Left leg fractured. He fell in the quarry.
202	Sept.	15	Stabell Gold Mines Limited	J. Gillis	45	Miner	Bruises on left arm. Was struck by a wrench which fell from a bucket 30 feet above in shaft.
203	Sept.	15	Consolidated Asbestos Limited	Ernest Rouleau	27	Pumpman	Right hip dislocated, several bruises on scalp, left arm and foot. Injured by a fall of rock while trying to put out fire under ground.
204	Sept.	16	O. Martineau & Fils, Ltée.	B. Pigeon	72	Stone breaker	While breaking stone, a piece fell on his left foot.
205	Sept.	17	St. Lawrence Brick Company	Colbert Tessier			Contusion of right thumb.
206	Sept.	18	Federal Asbestos Co.	L. G. Fortier	19	Driller helper	Left ankle bone injured. While working in jam a rock slid and fell on his foot.
207	Sept.	19	Asbestos Corp. of Canada, Ltd.	Philippe Demers	19	Loader	Asbestos crude in right thumb.
208	Sept.	20	Keasbey & Mattison Company	Alex. Groleau	63	Millhand	Injury to left eye and traumatic shock. When hammering a piece of machinery with a sledge, a small piece of steel flew into his eye.
209	Sept.	20	Ed. L. Gravel	Real Poulin	22	Labourer	Face bruises, and shock. Was buried under slide of stone dust.
210	Sept.	22	Asbestos Corp. of Canada, Ltd.	Jos. Racine	58	Bushman	Bruised leg, caught between log and chain.
211	Sept.	23	The Villeray Quarry Co., Ltd.	Adelard Gilbert	34	Millhand	Finger cut, followed by blood poisoning.
212	Sept.	23	Asbestos Corp. of Canada, Ltd.	Alfred Mathieu	19	Dumper	Fourth right finger bruised, by a chain hook.
213	Sept.	24	Consolidated Asbestos Limited	Alphonse Grégoire	28	Millhand	Right leg fractured above knee by a fall of asbestos bags from the top of a bin.
214	Sept.	24	National Brick Company	Omer Laplante			Missed footing when braking clay car and had his foot run over.
215	Sept.	25	Standard Lime Company, Ltd.	Alfred Beaudet	61	Labourer	Second finger of left hand cut. He was lifting a stone with a crowbar when another stone slid from a little above and he had his finger caught between the two.
216	Sept.	25	O. Martineau & Fils, Ltée.	A. Bousquet	40	Stone breaker	Lesion to the left leg, by a stone thrown by a blast.
217	Sept.	25	O. Martineau & Fils, Ltée.	E. Desjardins	19	Stone breaker	Right leg wounded, by a stone thrown by a blast.
218	Sept.	26	Asbestos Corporation of Can., Ltd.	Théo. Grondin	33	Foreman	Sprained his left knee.

NON-FATAL ACCIDENTS, 1924.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
219	Sept. 27	Asbestos Corp. of Can. Ltd.	Arthur Laprise	46	Loader	While loading boxes, he fell and bruised his right leg.
220	Sept. 29	Asbestos Corp. of Canada, Ltd.	Cyrille Bisson	51	Dumper	Had his hand crushed between a box and a bin frame.
221	Sept. 29	O. Martineau & Fils, Ltée.	B. Leonard	28	Carter	Left leg pinched between cart and wall.
222	Sept. 29	Laval Quarry Company, Ltd.	Réné Forget	42	Quarryman	Contusions at shoulder. Part of a chain block on crusher's platform fell on his shoulder.
223	Sept. 29	Consolidated Crushed Rock Ltd.	Henri Daigneault		Carpenter	Leg fractured, while moving a heavy piece of machinery.
224	Sept. 29	Consolidated Crushed Rock Ltd.	L. Hamel		Chauffeur	One arm dislocated. Started motor truck with one wheel off.
225	Sept. 29	Consolidated Crushed Rock Ltd.	P. Cormier		Chauffeur	Fracture at one arm. Same accident.
226	Sept. 29	Consolidated Crushed Rock Ltd.	A. Forget		Stone breaker	Cuts, by stone fragments.
227	Sept. 29	Consolidated Crushed Rock Ltd.	Pierre Boucher		Stone breaker	Hand bruised, by stone fragments.
228	Sept. 29	Consolidated Crushed Rock Ltd.	L. Levesque		Stone breaker	Foot bruised, by stone fragments.
229	Sept. 29	Consolidated Crushed Rock Ltd.	A. Arvisa		Stone breaker	One arm dislocated, hit by a piece of stone.
230	Sept. 29	Consolidated Crushed Rock Ltd.	Wm. Tremblay		Stone breaker	Leg fractured, by stone fragments.
231	Sept. 29	Consolidated Crushed Rock Ltd.	A. Bousquet		Stone breaker	Arm fractured, by stone fragments.
232	Sept. 29	Consolidated Crushed Rock Ltd.	P. St. Pierre		Stone breaker	Eyes injured by pieces of rock.
233	Oct. 1	Asbestos Corp. of Canada, Ltd.	Mike Rodnar	46	Loader	First and second fingers bruised, by stone rolling from jam.
234	Oct. 1	Asbestos Corp. of Canada, Ltd.	Louis Goulet	20	Loader	Finger punctured by piece of asbestos crude.
235	Oct. 3	Asbestos Corp. of Canada, Ltd.	Levi Turgeon	19	Labourer	Back sprained. Was hit by derrick boom.
236	Oct. 4	Asbestos Corp. of Canada, Ltd.	Jos. Aubin	33	Loader	Right hip bruised, by stone rolling from jam.
237	Oct. 4	Kearsbey & Mattison Company	Arthur Boisvert	33	Labourer	Left leg fractured. Injured was loading boxes near the jam when a big rock rolled down and struck him on the left leg.
238	Oct. 7	Asbestos Corp. of Canada, Ltd.	Philibert Martin	21	Conveyor man	Right arm mangled. Had his hand caught in conveyor drum.
239	Oct. 7	Consolidated Asbestos Limited	Jean-Bte Ainsley	52	Oiler	While attending to his duties, a piece of iron dropped on his right foot bruising his big toe.
240	Oct. 9	Canadian Johns-Manville Co., Ltd.	Ab. J. Gardner		Bagger	Contusion, breaking of skin, and effusion of blood under nail of third finger of left hand. Had his finger caught in between frame of bagging rack which happened to be broken.
241	Oct. 10	Montreal Crushed Stone Co., Ltd.	O. Lamoureux	46	Blacksmith	Sprained left ankle and bruised side, when falling off platform, fifteen feet high.
242	Oct. 11	Stanstead Granite Quarries Co. Ltd.	Frank Galazzo	51	Driller	Bruises on side. A wire rope slipped from stone that was being handled and struck him on the side.
243	Oct. 11	Asbestos Corp. of Canada, Ltd.	Ulric Nolet	34	Loader	Right foot bruised, by a stone rolling from jam.

244	Oct. 18	Quebec Asbestos Corporation, Ltd.	Gédéon Couture.....	33	Driller.....	Bruised and strained calf of left leg. While working in face of pit loosening rocks, a large piece of rock fell and struck him, causing him to slide to bottom of pit.
245	Oct. 20	Standard Lime Company Ltd.....	Pierre Corriveau.....	45	Labourer.....	Incised wound at right ear. When loosening rocks in crusher feeding bin, a rock fell on his crowbar and the latter struck him on the ear.
246	Oct. 20	O. Martineau & Fils, Ltée.....	L. Bazinet.....	22	Stone breaker....	Left arm fractured, by fall of stone.
247	Oct. 24	Asbestos Corp. of Canada, Ltd.....	Alex. Boucher.....	42	Driller helper....	Sprained his back, while carrying drill hose in under ground mine.
248	Oct. 24	Federal Asbestos Company.....	Albert Gagné.....	25	Carter.....	Severely bruised his arm and shoulder, when pushing a dray he fell.
249	Oct. 24	National Brick Company.....	B. Quinto.....	.....	Labourer.....	Thump of left hand bruised; when engaged in drilling operations in clay pit and holding bar for another man to strike he was hit by hammer on thumb.
250	Oct. 27	Asbestos Corp. of Canada, Ltd.....	Onésime Morissette....	48	Loader.....	Sprained his back, while loading boxes.
251	Oct. 28	Standard Lime Company Ltd.....	Alphonse Aubin.....	30	Labourer.....	Fracture of big toe of right foot. While he was loading cars, a rock rolled down the pile and struck his foot.
252	Oct. 30	Asbestos Corp. of Canada, Ltd.....	Léo Létourneau.....	18	Loader.....	Right eye injured by a piece of rock.
253	Oct. 30	Asbestos Corp. of Canada, Ltd.....	Loriv Dostie.....	26	Millhand.....	Strained his chest, while handling bags of asbestos
254	Nov. 3	Keasbey & Mattison Company.....	Edmond Croteau.....	32	Engine driver....	Small finger of right hand fractured. He fell in running away from cars which were being hoisted through the tunnel when the hoist chain broke.
255	Nov. 4	Keasbey & Matiston Company.....	Joe McCutcheon.....	50	Labourer.....	Left leg bruised. Injured was loading boxes near the jam when a rock rolled down and struck him.
256	Nov. 5	Detry Feldspar Quarry.....	John Driscoll.....	50	Shoveller.....	First and second finger of right hand crushed and subsequently infected. While shovelling in pit his fingers were caught between two pieces of rock.
257	Nov. 5	Maisonneuve Quarry Co., Ltd.....	Antonio Simoneau.....	20	Carter.....	Double hernia. Was squeezed between two carts where he was taking shelter during blasting.
258	Nov. 10	Quebec Asbestos Corporation, Ltd.	Josaphat Faucher.....	.....	Driller.....	Small vein broken in right eye causing serious injury perhaps resulting in loss of eye. When engaged in drilling in face of pit, a piece of rock flew up and hit his eye.
259	Nov. 10	Asbestos Corp. of Canada, Ltd.....	Alfred Lepage.....	35	Loader.....	Left foot bruised; was struck by a stone.
260	Nov. 11	Asbestos Corp. of Canada, Ltd.....	Adélar Leblanc.....	24	Loader.....	Fourth right finger bruised by a stone.
261	Nov. 11	Keasbey & Mattison Company.....	Adonias Vermette.....	19	Labourer.....	Tibia of left leg fractured. Injured was standing between two boxes when a big rock hoisted by a crane struck one the boxes which moved catching his leg.
262	Nov. 11	O. Martineau & Fils, Ltée.....	J. Combat.....	25	Stone breaker....	When dropping a stone, it bruised one finger of his right hand.
263	Nov. 12	O. Martineau & Fils, Ltée.....	Johu Coxmas.....	38	Stone breaker....	Wound at the head. A piece of stone fell from the quarry wall and hit injured on the head.
264	Nov. 19	O. Martineau & Fils, Ltée.....	O. Pelletier.....	41	Foreman.....	Left leg fractured by fall of stones.

NON-FATAL ACCIDENTS, 1924.

No.	Date	Name of Operator	Name of Injured	Age	Occupation	Nature of Wound and Cause of Accident
265	Nov. 20	S. B. Morton's Granite Quarry.....	Henry Wood.....	49	Quarryman.....	Fracture of two ribs, right side. In jumping to get out of way of sliding stone, he struck his side against another stone.
266	Nov. 22	Asbestos Corp. of Canada, Ltd.....	Odilon Martin.....	34	Millhand.....	Right foot sprained. A bag of asbestos fell on his foot, while loading cars.
267	Nov. 22	Asbestos Corp. of Canada, Ltd.....	Eudore Roy.....	34	Loader.....	Right hip dislocated. A cable derrick box was lowered on him.
265	Nov. 24	Asbestos Corp. of Canada, Ltd.....	Amédée Dupont.....	32	Loader.....	A rock fell on his foot and bruised his first right toe
269	Nov. 25	Wallace Sandstone Quarries Ltd.....	Hormisdas Racine.....	32	Driller.....	Blood poisoning following a slight abrasion of middle finger of right hand; when using a crowbar to move a block of marble the bar slipped, causing his finger to strike the stone.
270	Nov. 28	Asbestos Corp. of Canada, Ltd.....	Jos. Cyr.....	27	Loader.....	Pain in the left hand caused by an asbestos fibre splinter.
271	Nov. 28	Asbestos Corp. of Canada, Ltd.....	Aimé Lessard.....	33	Millhand.....	Chest sprained; was struck by asbestos bag falling from slide
272	Dec. 1	Asbestos Corp. of Canada, Ltd.....	Jos. Fontaine.....	34	Loader.....	Left thumb fractured by a stone which rolled from a jam.
273	Dec. 3	Asbestos Corp. of Canada, Ltd.....	Eug. Medardi.....	57	Loader.....	Right leg bruised; struck by a stone.
274	Dec. 3	Asbestos Corp. of Canada, Ltd.....	J. B. Roy.....	40	Loader.....	Right leg bruised; while loading boxes a stone struck his leg.
275	Dec. 4	Asbestos Corp. of Canada, Ltd.....	Philozaire Landry.....	27	Loader.....	First right finger bruised by stone rolling from jam
276	Dec. 10	Quebec Asbestos Corp. Ltd.....	Philibert Boulet.....	22	Labourer.....	Muscles of left thigh crushed at back near knee. He was engaged in helping to assemble a steam shovel when a steel beam slipped and struck his leg.
277	Dec. 16	Asbestos Corp. of Canada, Ltd.....	Napoléon Jacques.....	38	Driller.....	Bruised his third finger of left hand, when falling.
278	Dec. 16	Asbestos Corp. of Canada, Ltd.....	B. Bourgault.....	38	Loader.....	Right foot bruised by fall of stone.
279	Dec. 16	Maple Leaf Asbestos Corp. Ltd.....	Alfred Bourgault.....	44	Carter.....	Sprained ribs. When loading fibre into car, he slipped and fell between platform and car.
280	Dec. 17	Keasbey & Mattison Company.....	Antoine Elie.....	44	Driller.....	Scalp wound and contusions to the chest. While moving a drill, injured slipped and fell on rocks with the drill on top of him.
281	Dec. 17	Asbestos Corp. of Canada, Ltd.....	Honoré Leblond.....	32	Loader.....	Sprained his back, while loading boxes.
282	Dec. 17	Asbestos Corp. of Canada, Ltd.....	Jos. Champagne.....	45	Loader.....	Third and second finger of right hand bruised by stone rolling from jam.
283	Dec. 19	Asbestos Corp. of Canada, Ltd.....	Roméo Paquet.....	19	Loader.....	A stone on his right foot bruising one toe.

284	Dec.	20	Consolidated Asbestos Limited.....	Evariste Côté.....	23	Oiler.....	Left wrist and two fingers lacerated by piece of sheet iron he tried to take off a shaking screen in motion.
285	Dec.	20	Asbestos Corp. of Canada, Ltd.....	Alfred Létourneau.....	52	Loader.....	Wound at right thumb, by stone rolling from jam.
286	Dec.	23	Asbestos Corp. of Canada, Ltd.....	Philius Perron.....	32	Loader.....	Right wrist dislocated. Was struck by stone rolling from jam.
287	Dec.	24	Asbestos Corp. of Canada, Ltd.....	Arthur Vallée.....	33	Driller.....	Left eye injured by small piece of steel.
288	Dec.	24	Asbestos Corp. of Canada, Ltd.....	Honoré Duval.....	44	Loader.....	Wound at the right leg, struck by a hoisting chain.
289	Dec.	24	Asbestos Corp. of Canada, Ltd.....	Gédéon Varhon.....	34	Loader.....	Injured his back when falling on stones.
290	Dec.	24	Provincial Roads Department.....	Philius Courteau.....	62	Labourer.....	Contusions at the back and legs. Buried under a slide of gravel.
291	Dec.	26	Consolidated Asbestos Limited.....	Léo Noel.....	18	.....	Right arm fractured. When trying to jump off a conveyor on which he was riding, his foot slipped thereby throwing him back onto the conveyor belt to be thrown into a bin.
292	Dec.	29	Asbestos Corp. of Canada, Ltd.....	Odule Cyr.....	42	Labourer.....	Left hand bruised, by a piece of lumber which fell on him.
293	Dec.	29	Elzéar Verrault.....	A. Tremblay.....	Quarryman.....	Was struck by stone falling from quarry wall.

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