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CONTENTS.

Editorials	449
(a) The Two Functions of Rescue Apparatus	449
(b) The Passing of Le Roi	449
(c) To The Investor	450
(d) The Geologist and His Glim	450
(e) The Technical Education Commission	450
(f) The Hammer Drill	450
(g) Editorial Notes	451
Growth of Steel Output in Canada	451
Personal and General	451
Early Copper Mining in the Province of Quebec, by James Douglas	452
An English Gold Stamp Battery in South Africa, by F. C. Perkins	456
Mineral Production in British Columbia in 1909	457
Mine Rescue Stations in British Columbia	460
Canadian Mining Institute	460
Hammer Drills in Overhand Stopping and Raising, by H. B. Williams	461
Canadian Minerals at the Brussels Exhibition	463
The Dinner Hour	464
Personal and General	464
On the Distribution of Asbestos Deposits in The Eastern Townships of Quebec, by John A. Dresser	465
The Clay and Slate Deposits of Nova Scotia and Portions of New Brunswick and Prince Edward Island, by Heinrich Ries	470
Correspondence	471
Special Correspondence	472
General Mining News	475
Company Notes	476
Statistics and Returns	477

THE TWO FUNCTIONS OF RESCUE APPARATUS.

Although rescue, or breathing, apparatus was primarily designed for the salvage of life after explosions in collieries, yet in practice the devices have been more utilized in fighting fires.

Experience has thus taught us the underlying principle, namely, that the provision of rescue apparatus for fighting fires in mines is a matter to be left in the hands of mine owners, but that the salvage of life after explosions, or in circumstances involving great danger to the rescuers, is one that concerns the Government more than the individual owner.

This principle has been recognized by the Home Secretary of Great Britain. In effect it has been acted upon by several Canadian collieries. But our Governments, both Provincial and Federal, have been exceedingly tardy in taking any steps whatever.

As matters now stand, those of our collieries that possess rescue stations may be called upon at any time to furnish assistance to other mines. This is absolutely unfair. In rescue work there is always a large element of risk. That risk is unreasonably large when the rescuers attempt salvage work in mines with which they are unacquainted. Indeed, it is debatable if such requests should be granted.

In these circumstances it is manifestly the duty of the Federal Government, and equally the duty of the Provincial Governments, to see to it that all coal mining centres are provided with the means of instructing coal miners in the use of rescue apparatus. Whilst mine owners must do their part, the Government cannot afford to ignore the moral obligation resting upon its own shoulders.

The subdivision of responsibility as indicated above forms the only practicable basis upon which joint work can be begun.

THE PASSING OF LE ROI.

There is something unspeakably tragical in the failure of a full-grown mining enterprise. Some years before the Rossland boom began, two French-Canadians, Morris and Bourgeois, staked the Le Roi claims. In 1892, Col. I. N. Paton, of Spokane, Washington, took over the mine. In 1893 extensive development was commenced. One year later the meteoric Augustus Heinze came on the scene. He it was who built nine miles of railway from the mine to Trail; also he erected a smelter wherewithal to treat the ore. Just after the height of the boom, ex-Governor C. H. McIntosh, known to all adult Canadians, came on the scene as a representative of one of Whittaker Wright's syndicates. After purchasing Le Roi for a sum exceeding \$4,000,-

000, the syndicate undertook to develop and prospect the property on a scale that was, perhaps, hardly warranted. A smelter was erected at Northport. Diamond drilling was begun, and sinking and driving pushed vigorously.

At least \$20,000,000 in gold has been taken out of Le Roi. For some reason—there are those who assert that the mine has suffered from a surfeit of London management—Le Roi has never yielded continuous profits. In any case, its tenuous existence has been brought to a close. And simultaneously expire the hopes and expectations of many hundred unfortunate shareholders.

TO THE INVESTOR.

The mining boom serves a special purpose. It advertises the country, it stirs men to abnormal activity, it induces the circulation of enormous sums of money. These are its benign aspects. We need not dwell upon the other side of the shield.

But, psychologically, the mining boom leads men astray. Currents and gusts of enthusiasm sweep the investor off his feet, he follows the crowd, and, usually, is lost. . . .

We have recently returned from a visit to Eastern Canada. In those parts precious metal mining is supposedly dead. Despite this popular impression, we feel safe in stating that nowhere in Canada are there more numerous and more easily available opportunities for making legitimate profits in mining of all kinds.

It were unseemly to be too specific. We should hardly care to be the moving cause in a wild rush to the east. But it is at least impressive to run over the list of minerals that are known to exist in workable quantities. That list includes tungsten, gold, antimony, manganese, gypsum, barite, infusorial earth, talc, copper, and iron. Prospects of tin are known. Throughout certain portions of Quebec alluvial gold awaits modern investigation. It may be asserted without fear of contradiction that nowhere can the investor acquire promising property more cheaply and nowhere can he, in the main, get a better run for his money.

THE GEOLOGIST AND HIS GLIM.

Many centuries ago a Chinese prophet brought upon himself the scorn and contumely of a younger generation because he refused to commit himself to an opinion concerning the future life. To-day that prophet's name is still revered. His critics are lost in the beneficent obscurity of the ages.

The modern analogue of the Oriental prophet is the geologist. His business in life is to make a commercial diagnosis of scenery. So varied and so open to various interpretations is the evidence of nature that the geologist must often halt and stumble. Hence he gives the

young scoffer his opportunity. And from all sides we hear shrill voices rising against the geologist.

Whilst we shall refrain from expressing our own opinion as to the ultimate value of the geologist, we shall not miss the chance of expressing our sincere sympathy for him. His is a most distressing lot. His mistakes are chalked up against him for all time. His achievements are not remembered. Is it possible that he should be more dogmatic? Is it probable that he obscures his light under a bushel of technical terminology? Perhaps, and we make the suggestion in all due modesty, perhaps if the geologist were to talk to us in words of one syllable, all of us would be happier.

THE TECHNICAL EDUCATION COMMISSION.

The universal tendency to sneer at Royal Commissions has not been so marked in the case of the recently appointed Federal Commission on Technical Education. Sneers there will be, but we believe that all serious citizens hope and expect excellent results from the work of this latest Commission.

The cordial welcome extended by the city of Halifax, when the Commission's labours were formally opened, was a most auspicious start. Without undue loss of time the Commission tackled its proper work, the work of collecting facts, figures, and opinions, as to the educational needs of this country. At present the Province of Nova Scotia is being covered. Later the whole of the Dominion is to be worked over.

We believe that from the array of evidence to be collected by the Commission many valuable facts will emerge. Its final report should be a document of great significance. But we are yet firmly of the opinion that the Commission lacks balance, inasmuch as its membership comprises no representative of the mining industry.

This omission can easily be rectified. The point should be pressed upon Ottawa insistently and unremittingly.

THE HAMMER DRILL.

One of the most interesting of recent papers is that entitled "Hammer Drills in Overhand Stopping and Raising." As the author, Mr. H. B. Williams, gained his experience in a Canadian mine, the paper has a particular claim upon our attention.

The comparative merits of the reciprocal and of the hammer drill are not yet determined. Much can be said on both sides. Probably both types have been unfairly criticized. But the fact appears to be established that the hammer drill is a necessity in narrow stopes. Mr. Williams' statement of comparative costs is startling, and his general assertions as to the efficiency of the hammer drill are most radical.

EDITORIAL NOTES.

From the Quebec asbestos regions come reports of much activity. Within a short time four new mills have been put in operation, one at Black Lake, one at Thetford, and two at Robertson. Labour is plentiful, and no shortage is expected.

On June 1st, 1911, the taking of the next census of Canada will commence. It is to be hoped that all concerned in the mining industry will do everything possible to aid the census-taker. It is of prime importance that the industry be given proper recognition.

By late advices we learn that proclamation has been made of new Coal Mine Regulations in the Province of British Columbia. These call for the provision by owners of coal mines of adequate rescue apparatus, supplementing the Government stations and trained rescue crews.

The "Daily News-Advertiser," Vancouver, supports the CANADIAN MINING JOURNAL in its remarks upon the failure of the Minister of Labour to see that the mining industry was represented on the Commission on Technical Education. Our contemporary reminds its readers that the matter is one that should appeal with especial force to citizens of British Columbia.

Several correspondents have drawn our attention to the fact that Hon. Mr. Templeman has failed to evince practical interest in the establishment of rescue stations. As the Hon. Mr. Templeman has pledged his word definitely to support this movement, we are disappointed at his indifference. We suggest that a prod or two from mine operators would do no harm.

GROWTH OF STEEL OUTPUT IN CANADA.

The growth of the pig iron production in Canada, as well as that of the Dominion Corporation, since 1901, is clearly shown in the following table:

	Total for Canada. Tons.	Prod. of Dominion Steel Co. Tons.
1909	609,400	255,900
1908	686,800	262,800
1907	416,600	257,000
1906	585,400	210,100
1905	390,200	162,200
1904	277,700	96,600
1903	323,700	155,130
1902	348,600	191,000
1901	165,900	111,000

The above figures show that the company has increased its production of pig iron from 111,000 tons in 1901 to 262,800 in 1908 and 255,900 in 1909, the slight loss in the latter year as compared with 1908 being due to the inadequacy of the fuel supply received from the Do-

minion Coal Company. The output of steel ingots has been as follows:

	Total for Canada. Tons.	Prod. of Dominion Steel Co. Tons.
1909	570,600	296,750
1908	662,000	279,500
1907	606,500	269,000
1906	569,200	235,300
1905	300,400	163,150
1904	128,900	62,850
1903	260,600	135,300
1902	136,400	99,400
1901	33,300	.....

The Dominion Company began to turn out steel in 1902 when it totalled 99,400 tons, increased since then to 296,750, an even greater gain than that recorded in the pig iron production.

The Government bounties on pig iron and steel ingots expire on December 31st this year, and those on wire rods, which were given in lieu of tariff, on June 30, 1911. It is thought that when the different bounties are terminated they will be replaced by a protective tariff, although the cessation of the bonuses indicates that the steel industry in Canada is thought to have established itself upon a firm and lasting foundation.

To take care of future business, the corporation has been carrying out extensive plant alterations and improvements, which will also materially reduce productive costs and increase the total capacity 50 per cent. The first new work to reach completion is the set of coke ovens which embody all the improvements of the last ten years. There are 120 of these, requiring the service of 56 men and capable of turning out 720 tons of coke every 24 hours. The 500 old ovens produce about 1,250 tons of coke a day.

Following these the open hearth furnaces will be finished and will be among the largest in the world, with a capacity of 500 tons each. A new power plant is under way, as well as a finishing plant, which will consist of a continuous roughing mill and Belgian train.

These improvements were provided for in the consolidated mortgage bonds issued last year, about \$2,285,000 of the \$5,000,000 total being set aside for the purpose.

During the past four seasons, net earnings have averaged about \$2,327,715 a year, but after the different betterments have been completed the income account ought to show a gain corresponding with the greater capacity.

PERSONAL AND GENERAL.

Mr. H. E. T. Haultain has opened an office at 41 National Trust Chambers in connection with his work as consulting mining engineer.

Early in July Mr. A. A. Hassan left Cobalt for Porcupine. His visit to Porcupine will probably cover the whole month.

Mr. Edward Slade, who was recently manager of the Amalgamated Asbestos Corporation's properties at Black Lake and prior to the merger was manager of the British-Canadian Asbestos Company, has, it is understood, been appointed general manager of the Black Lake Consolidated Asbestos Company. This appointment is considered by the Black Lake Company to be an especially satisfactory move, as Mr. Slade has a high reputation in the asbestos industry.

EARLY COPPER MINING IN THE PROVINCE OF QUEBEC.

By JAMES DOUGLAS, LL.D., NEW YORK.

(Canadian Mining Institute, Annual Meeting, Toronto, 1910.)

Sir W. E. Logan, in his report for 1847-48, as Director of the Canadian Geological Survey, refers to copper in the Eastern Townships, and states: "The quantity appears to be too insignificant, in any case, to be worthy of further notice, with the exception of three deposits, where the ore, occurring in veins bearing the character of regular lodes, seems to be sufficient in amount to justify the risk of small careful trial. . . . One locality is on the 4th lot of the second range of Inverness, in the occupation of Mr. George, where, on the east southeast side of a valley not far from the position which would be in the direct run of the associated serpentines and dolomites of Leeds and Inverness, a vein of opaque white quartz occurs in chloritic and talcose slates, and, coinciding in its direction with the strike of the measure, maintains with the valley a course a little to the north of east. The quartz vein, a mixture of chlorite, presents the thickness of about two feet, and the ore is disseminated in it in irregular patches and lenses, some of which weigh upwards of a pound; but the patches at the outcrop, in the spots experimented upon, are so thin that, notwithstanding the product of the pure ore, which is variegated copper, is upwards of 60 per cent., the whole two feet of the lode do not yield more than 0.74 per cent cwt., which would not give more than 90 pounds of copper in a fathom forward by a fathom vertical."

Nevertheless, it was on this not very flattering showing that the Megantic Mining Company was organized soon after the date of Sir William's report. The company secured other copper lands in New Ireland and Halifax Townships, and it still exists—the only survivor of the many organizations chartered in those early days.

My personal recollections are of spending my summer holidays of 1850 at these mines in Inverness. I recollect my father finding one of the shareholders reading by the light of a candle stuck into the blasting powder of an open keg, and another calculating seriously on the best way of disposing of his enormous prospective fortune and deciding on patriotically paying off the British national debt.

The copper deposits of Inverness which were then worked resembled the small rich gash veins which were subsequently opened more extensively in Leeds, but which proved in both places too unproductive in quantity to support a mining organization. I do not think the George veins were ever found to be associated with interstratified beds, though further development may show that such connection exists.

Some desultory work was done in Inverness as late as 1856.

The discoveries in the neighbouring Township of Leeds had withdrawn attention from those of Inverness. The same promoters and stockholders were interested in both. Dr. Douglas, when in England in the spring of 1853, interested the firm of John Taylor & Sons sufficiently to induce them to send out the well known mining and metallurgical engineer, John Arthur Phillips, to report on this prospect. I have not the report he made to them at that date; but in 1856, when the Quebec and Saint Francis Mining Company was organized to purchase and work the mine, Mr. Phillips supplied the company with the following statement:

Report of the Mines of the Quebec and St. Francis Mining Company.

"The lands acquired by the Lower Canada Mining Company in the Township of Leeds, County of Megantic, visited by me in company with Captain F. Kent in 1853, are principally composed of talcose chloritic and micaceous shales, of which the stratification in some localities is disordered, but has a general run approaching east and west. Their underlie, though variable in amount, is almost without exception towards the north.

"At Harvey's Hill, to which the attention of the company has been chiefly directed, a large mass of steatite crops out on the southeastern side of the concession. This substance contains in many places crystals of carbonate of iron; numerous specimens of asbestos were also remarked, and some of the shale beds contain large radiated masses of crystallized hornblende.

"The whole of this district is traversed by courses of white opaque quartz, which vary in thickness from a few inches to several feet. These in some instances appear to follow the general direction of the stratification of the country, whilst in others they are evidently true lodes intersecting the surrounding strata at a strong angle.

"Such veins in some cases contain copper, specular iron and arsenical pyrites, but are seldom accompanied by any considerable amount of gossan.

"The shale in the neighbourhood of these veins frequently contains well-defined crystals of iron pyrites. The general run of the true veins is about 30 degrees east of north, whilst their underlie, which is extremely variable in amount, is usually towards the west.

"In the Harvey Hill property at least five of these veins occur, and are all more or less spotted with spathose iron and grey copper ore. In addition to the veins above mentioned, and which vary in thickness from eight inches to three feet, this locality exhibits branches of rich copper ore.

"On arriving on the ground we found that with the exception of some very ill-directed shodding, no mining operations of any description had been carried on, and that these veins had been merely opened to such an extent as to admit of the extraction of some barrels of ore, which were forwarded to London.

"After having completed our general survey of the whole district, we set two men to open on the backs of the branches before mentioned. That called the Brook Lode was thus uncovered for a distance of about ten fathoms, and found to run thirty degrees east of north, with an underlie of one and a half foot in a fathom towards the northwest.

"At both extremities of the cutting, which was nowhere above four feet in depth, very excellent stones of grey copper ore were extracted; but towards the middle of the opening from two to three fathoms of unproductive ground were found to occur.

"We raised during our operations at this place eight cwt. of very fine copper ore, which was brought down to Quebec and forwarded to London.

"This lode, which at the time of suspending our operations was evidently improving in the eastern end both in size and produce, was again cut by an open drift about eighty fathoms south of the point last mentioned.

"In this locality, although much disturbed, very beautiful stones of horse-flesh ore are found, it being from this place that the finest specimens sent to England were procured.

"About twelve fathoms to the east of the foregoing vein, another rich branch of copper ore was discovered and partially explored previously to our arrival. This vein could be traced for a considerable distance at the surface, and was opened on, for a length of about six fathoms, and a depth of some five or six feet, but although producing in some places exceedingly rich stones of copper ore, we found it very much disturbed and contorted, and regret to say its aspect was not materially improved by the workings we ourselves made upon it.

"In addition to the two branches of ore above described, a third was discovered on the Harris Lot, at a distance of little more than a mile to the southwest of the other. This lode, which occurs in a channel of highly magnesian shale, we opened on the back for a distance of about five fathoms and to a depth of eight feet, and in doing so obtained nearly one and a half ton of rich sulphuret of copper, slightly intermixed with crystallized carbonate of iron.

"The Harris Lode, as this vein has been called, was found when first opened, to be extremely rich in copper ore, and in fact still remains so; but although it evidently increases in size in proportion as it goes down, the ore last obtained was perhaps more mixed with carbonate of iron. This vein runs nearly north and south, and underlies towards the west, but from the slightness of the dip, together with the contortions to which the enclosing rock has been subjected, it is difficult to determine either its direction or the nature of the underlie it may ultimately assume.

"The other lodes in the district have, without exception, remained totally unexplored, since from the limited time allowed for the inspection, we were obliged to confine our operations to such veins as afforded the most favourable indications. It is, however, certain that numerous other true veins occur in this district, and that wherever exposed they almost without exception contain more or less copper ore. On the other hand it may be remarked that many bands of spar interposed between the layers of the strata, also afford copper, and that these are in some cases cut off in depth.

"The ores obtained from this property in 1853 yielded thirty-nine per cent. of copper, and were sold at the rate of £42 10s. per ton.

"In the month of September, 1855, this district was visited and inspected by Captain Francis Bennetts, who remained a longer time on the ground, and more fully explored the different lodes than had been done two years previously by Captain Kent and myself.

"At a distance of fifteen fathoms northwest of the opening on the Brook Vein, Captain Bennetts discovered a lode about twenty inches in width, bearing a little west of north, and on this he extended an open cutting six fathoms in length and eight feet in depth. At the time the workings at this place were discontinued, the lode in the bottom was from fifteen to twenty inches in width, without any perceptible underlie, and composed of a mixture of quartz, carbonate of iron, and grey copper ore.

"The lode in this excavation will for a distance of about two fathoms yield one ton of copper ore per fathom. In the other portion of the cutting the lode has been slightly disordered by a small band of killas. There can be but little doubt, however, that it will

again yield ore a few feet beneath the point at which the killas has passed through it.

"Nine tons of ore, yielding from thirty-six to forty-two per cent. of copper, were raised from this cutting by two men in the course of four weeks. The Harris Lot, which was also explored, presented a regular lode about one foot in thickness. About two tons of ore were extracted from this vein as a sample, and forwarded to England.

"During the time that Captain Bennetts was employed in exploring this property he raised and forwarded to Quebec nearly twelve tons of ore, of an average yield of forty per cent. of copper, and a total value of about £500.

"With regard to the facilities for mining, it may be remarked that at Harvey's Hill the whole of the lodes may be cut by a level, at an average depth of about thirty fathoms.

"The land in this locality consists of about one-half cleared ground, available for the cultivation of corn and other produce, whilst the remainder is covered by an abundance of timber, well fitted for every mining purpose.

"The roads in the neighbourhood are all exceedingly bad, and must in some seasons be quite impassable; but the Grand Trunk Railroad passes within twenty miles of the mines, and considerable facilities exist for the construction of good common roads. The present cost of carrying ores from these mines to the St. Lawrence varies from £3 to £3 10s. per ton. Labour, and every manufactured material, is fifty per cent. dearer than in Cornwall. Water power, for the purpose of washing, is to be obtained on the mines.

"In conclusion, I would remark, that from the number of lodes already discovered, and the uniform success which has hitherto attended the shallow workings above described, there can be no doubt but that this ground forms a tract of more than ordinary promise, and one which merits a more extensive and systematic trial. I would add that a sum of from £5,000 to £6,000 will probably be found amply sufficient for opening out the mine.

"J. ARTHUR PHILLIPS."

"I beg to confirm the various statements made in the foregoing report, and to signify my concurrence with the opinions expressed by Mr. Phillips relative to the property of the Quebec & St. Francis Mining Company.

"FRANCIS BENNETTS, JUN."

"Kensington, February 11th, 1856."

The operations of the Quebec & St. Francis Company were sufficiently flattering to induce some gentlemen in London to organize in 1858 the English & Canadian Mining Company, with a capital of £40,000. The history of the English company was that of many another—each annual report regretted that operations were conducted at a loss, in spite of favourable developments and brighter prospects. Bad roads, costly transportation and insufficient water supply for ore dressing, were the really valid grounds for the disappointing results. The operations as gauged by shipments of a mine to-day, were contemptibly small.

They were in—

	Tons.	Cwt.	Qrs.	Lbs.	
1858	9	15	0	2)	
1859	43	7	0	21)	Averag-
1860	104	5	3	0)	ing about
1861	70	4	1	6)	30 p.c.
1862	94	17	2	21)	
1863	113	20	3	14	26 p.c.
1864	225	12	3	3	20 p.c.
<hr/>					
Making a total of 671	20	2	11		

The mining ton being 21 cwt., or 2,352 lbs.

But during the administration of the English company very interesting developments were made. In 1859-60 the value of the interstratified beds was first appreciated, and work was done on them. Mr. Williams, the superintendent, referring to the bed, reported to the Board on 4th February, 1860:

"I herewith beg to enclose you monthly report for January, in which I refer to the visit of our eminent Provincial Geologist, Sir W. E. Logan, to this place. He was much pleased with the works, and thinks we have a great future in our interstratified bed, and considers it a most valuable deposit; in fact, he did not expect to see anything so promising."

And on February 24th he reported:

"We have met with in our interstratified bed, within the last few days, a few isolated crystals of galena, which have given me an assay 72 1-2 per cent. of lead and 70 ounces of silver to the ton of lead. The quantity, however, that we have yet met with is so small as to be considered of no value, though I should be glad to see it increase and become one of our important products, which it might be, did we find it in a reasonable quantity."

The ore from the interstratified beds became henceforth the principal source of supply of the English company. Mr. S. Arthur Sewell, one of the directors, visited the mine, and he reported to the board that:

"This adventure must not be judged of by the rules applicable to those of like kind in this country. To estimate it properly we must take into consideration the almost primeval nature of the district, its distance from any rail or water communication, the scarcity and dearth of labour, the entire absence originally of all accommodation for residence at the mines, and its isolation from any markets where the necessaries of life or the appliances of civilization are procurable.

"With this in view, I must say that during my short stay at the mines I was astonished at the energy which, in a comparatively unsettled country, had pushed forward mining operations of great extent, over a surface of about fifty acres, had erected workshops, built cottages for the labourers, opened stores for their supply, dug reservoirs for water, made tramroads for the transmission of ore from the mines, and last, but not least, constructed roads through forests and over swamps for its further transmission to port for shipment."

By 1861 the directors issued a circular, in which they say:

"You are aware that the original capital of the company has been all called up. The returns during the present year have increased upon those of 1859, but are not sufficient to allow the payment of a dividend out of profit. The company's managing superintendent, Mr. Herbert Williams, is now in England, and will be at the meeting to explain the present condition and future prospects of the undertaking.

"The insufficiency of the present capital has been for some time manifest to the directors, and they have been in correspondence with Mr. Williams and the Canadian committee on the subject. Mr. Williams, in a letter dated the 10th October last, gives the following as his opinion of the sum required:

"In estimating the additional capital that we may probably require, the time occupied before we realize our products must be considered. It is twelve months since some of the ores now at Swansea left Harvey Hill, and the average, on account of our long winters, cannot be less than about nine months, unless we send some home by way of Portland, or try the Boston mar-

ket during the winter months. Hence we shall require about nine months' working capital on the average of the year. Presuming we confine our expenditure to the present limited sum of £400 per month, we shall require a sum of £3,600 to carry on the work for that period. I fully trust we shall be able, before the expiration of the nine months, to open out sufficient grey ground to meet our expenditure by the products. Hence the following heads of expenditure will have to be considered by the board as the estimated capital required for completing the works already commenced, and, I trust, bring the mine, which certainly looks promising, into a healthy condition.

General exploration of the company's lands...	£2,000
Buildings	600
Roads	680
Continuation of Morrison's adit beyond the period of nine months	750
Working capital for nine months	3,600
Contingencies	370
	<hr/>
	£8,000

"In consequence of the above communication your directors have made enquiries as to the best terms on which the above sum may be obtained, and have to report that a friend is willing to furnish the above amount, or such part of it as may be required, for three years, on debenture bonds, at 8 per cent. per annum, interest payable half-yearly, to be a first charge upon the property and produce of the mines, after paying working expenses."

But the report for 1862 opens with a cry of despair:

"At the formation of this company in the spring of 1858, it was little expected that four years would have elapsed without a sufficient return from Canada to divide as a dividend amongst the shareholders, but such is unfortunately the case up to this time, notwithstanding the indications of mineral wealth were and still continue to be of a very encouraging nature.

"The shareholders are aware that the capital of the company raised in England became exhausted in 1860, and that by resolutions passed at an extraordinary general meeting, held on the 28th February, 1861, power was given to the directors to raise on mortgage the sum of £8,000, to be taken up as the necessities of the company might require. The first installment of £1,000 was received from the late Mr. C. Tilt on May 1st last, and, subsequently, four other sums of that amount have been received."

A fire at the ore dressing plant interfered with the shipments. The company sent out a Mr. Tregoning for advice. One of the paragraphs of his report expresses his bewilderment at the departure of our ore deposits from European standards.

"In these slates have been discovered some remarkable 'lenticular masses' and interstratified beds of copper ores, and these ores present with the slates in which they are embedded geological features totally different from those of the general mining districts of Northern Europe, but may be considered a type of an extensive cupriferous formation peculiar to this part of Lower Canada, and which there are strong reasons for believing contains a vast deposit of mineral wealth.

"From the appearance of the copper ores when discovered at the surface, they were supposed to be the 'out-crops' of what in depth would prove regular and well-defined lodes, as they did not coincide with the slates either in strike or dip, but after being opened, and yielding some considerable quantities of valuable (copper) ores, they were found to thin away from

their centres both horizontally and vertically, and disappear, having assumed the form of lenticular masses, variable in size, and succeeding each other at irregular intervals, and principally composed of quartz, associated with rich ores and bitter spar. In their occurrence and productiveness they will probably be governed by the bands of slates in which they are embedded. The probable average size of these lenticular masses is from 10 to 12 fathoms in length by 5 fathoms in height, and at the centre from 2 to 4 feet in thickness. Many far exceed these limits, and some are much less. They are equally variable in produce, as some have only yielded a few hundredweight of ore, while others have given several tons. About 300 tons of copper ores have been raised from workings made on these masses, worth about £6,000. Of this quantity about 60 tons, containing from 30 to 40 per cent. of copper, have been obtained from the Fanny Eliza alone, which has been discovered and worked at a depth of 30 fathoms from the surface, by cross-cut from Kent's shaft. This valuable discovery proves a singular and important feature of this enterprise, and one greatly in its favour, and from its appearance and the favourable geological character of the nacreous slates, there is every reason to believe that at greater depth these 'lenticular masses' will be found to increase in size and productiveness."

At this crisis some relief was received by a promise of a sale of the property to a Boston firm of brokers who advanced a forfeitable sum of \$20,000. The value of the property was apparently assured by the consensus of so many notable experts, and the sale would probably have gone through but for the financial complications due to the increasing rise in the value of gold in the United States. These negotiations failing, the principal English shareholders tried in vain to float on the English market the London & Quebec Copper Mining Company, with a capital of £100,000. The Englishmen being unwilling to risk more in the venture, some Canadians undertook to pay the company's debts and to buy out the English shareholders.

The Canadian company never had adequate means for prosecuting the work. The old dressing floor had been planned after the oldest English models, using hand jigs and disregarding all labour-saving appliances. And the water supply was inadequate and variable, being derived from hillside reservoirs. When the English company was bought out, it was contemplated to build better works on the Palmer River, not more than a mile away; but this reasonable plan was abandoned in favour of the leaching method of Messrs. Whelpley & Storer. It was a method based on sound chemical principles but carried out by the adoption of as many mechanical complications as perverse human ingenuity could devise to frustrate success. Pulverized charcoal was added to the ore to create an intense heat in a shaft furnace where a most moderate heat was required. Storing pulverized charcoal in a room lined with cotton flannel is as dangerous as storing lighted matches, and the mill when it mysteriously caught fire exploded, rather than burned up, before the process had really had a fair trial.

The engine and boilers had been saved, and good concentrating works, provided with Rittenger jigs and designed on his general plans, replaced the Whelpley & Storer leaching method.

After the fire in 1867 my father took a lease of the property, undertaking to pay \$5,000 a year and to erect a 50-ton concentrating mill. His operations under the lease were less unsuccessful than they had been under the old company. The output rose to about 500 tons of

concentrates a year, and the revenue nearly covered the actual operating expenses. It was, however, a struggle against penury; and while extravagance has wrecked many a mining enterprise, to the shifts and uneconomical expedients, incident to shortness of funds, not a few other failures have been due.

During this lease the bed which was supposed to run 3 1-2 per cent. carried that grade of copper over a comparatively limited area where a series of deep and surface veins affected its copper contents. Beyond this system of veins it carried apparently about 1 1-2 per cent. It could not, therefore, be worked profitably under the existing conditions with the existing appliances. But the deep veins, especially the Fanny Eliza, yielded an excellent grade of ore and promised so well that a Glasgow organization, the Harvey Hill Copper Company, subscribed a working capital in 1872. The Fanny Eliza Lode and the so-called East Lode had yielded the lessor most of his revenue, but were worked uneconomically by winzes sunk below the upper bed. Both veins looked so promising for permanency that Capt. Whitburn, who was sent out by the Glasgow company, decided to spend the company's working capital on a vertical shaft at nearly a couple of thousand feet distant on their strike from the point to which they had been explored. The veins were found where expected; but were barren and the company treasury was empty. The company was formally wound up in 1879. The same series of events have, I believe, been repeated since then—resuscitation, a lingering life, death and burial. And yet I think the property may deserve a better fate.

The ore deposits of Harvey Hill may well have puzzled Mr. Tregoning, as they have scant resemblance to those worked in Northern Europe; but in the rocks of the Quebec group and where those same rocks occur in North Carolina and elsewhere, they sometimes carry copper under similar conditions.

At Harvey Hill three beds were met with which, if they extend over the entire hill, would exist at the following depths below the surface at Kent's shaft:

1. The uppermost bed, cut in grass-shaft No. 2, and from which a great deal of ore has been extracted by the Kent shaft, at 20 fathoms from the surface.
2. The second bed, that lying on the soapstone in Fremont's shaft, which should be at about 60 fathoms from the surface; and
3. The lowermost bed, that met with near the end of the adit, and which should be at about 20 fathoms deeper still, or at 80 fathoms from the surface.

There is, however, no likelihood of these beds being of such great extent, and it is certain they are not of the uniform richness at one time attributed to them.

No exploratory work was done, and no ore was extracted from any of the beds but the uppermost, and as the deeper beds were not encountered in sinking on the shoots of ore in the Fanny Eliza vein, they probably are not of very great extent. The areas of these beds and their copper contents could, however, be very cheaply determined by either churn or diamond drills.

Should any intention to re-open the mines be seriously contemplated, such preliminary exploration work should be done on the beds, as the contribution of ore from the veins, though valuable, would probably be small and the beds would have to be looked to for quantity. The opinion expressed by the Geological Survey that the beds fed the veins is questionable. The impression made on me was rather that the deeper veins fed the upper bed, as its slates were most productive where the deeper veins entered it. These apparently not only enriched it but injected into its slates the con-

stituents which composed their gangue. On the Harris lot, one mile from Harvey Hill, a shallow shaft was sunk on a vein of bitter spar yielding copper glance and visible gold; but neither here nor on any part of the property was what would be considered thorough and judicious development work ever done. Company after company undertook to work the mines with insufficient capital. The cost of mining and concentrating, as compared with modern methods of stoping, on a bed ten feet in thickness, were high.

They used to be estimated at:

Mining, per ton	\$4.00
Dressing the ore (concentrating), per ton	1.75

The cost of transportation to Quebec was \$10.00 a ton, and to Boston, \$15.00 a ton. Harvey Hill may now be considered to be on the Quebec Central Railway. The above figures for extraction and treatment might now be reduced to one-third.

But it is doubtful whether any of the mines of the province would be singly productive enough to feed a profitable smelter, and few copper ores or even copper concentrates can bear a heavy transportation charge. If the copper mines of the province are to be advantageously opened, it should be on some principle of co-operation by a strong company.

These copper deposits were, when they were most actively worked, distributed as occurring in "three synclinal troughs."*

The first is briefly defined as "the synclinal extending from the Township of Farnham, near Missisquoi Bay, to the Seigniorie of Lauzon, on the St. Lawrence. This, where it is traversed by the St. Francis, is nearly or quite separated into two parts by the appearance of the underlying slates. The southwestern portion appears to be divided by an undulation into at least two subordinate troughs, thus giving the Roxton and Ely an additional breadth to the exposure of these rocks. The copper deposits of Upton, Acton, Wickham, Roxton, and Durham, occur in this synclinal, while in its northeastern extension are those of Wendover, Somerset, Nelson and St. Flavien."

The second synclinal is described as "extending from St. Armand to the Seigniorie of St. Mary, on the Chaudiere. In it are the copper deposits of Sutton, Shefford, Stukely, Melbourne, Cleveland, Shipton, Chester, Halifax, Leeds, Inverness, and St. Mary. In its southern extremity, this synclinal is divided into two by Sutton Mountain, and while one part occupies Sutton Valley, the other extends southward into Potton . . ."

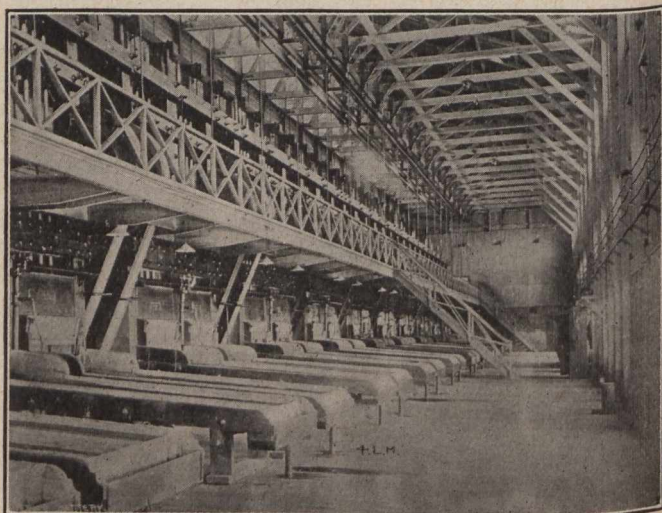
The third synclinal is described as "extending from the Owl's Head Mountain on Lake Memphremagog, to Ham, and includes the Stoke Mountains. An extension of this is traced north-eastward to Vaudreuil and St. Joseph, on the Chaudiere and beyond it, into Buckland. Between the southwestern portion of this synclinal and the second one, is a large area occupied by newer rocks, of the same age as those which limit the belt to the southeast. They include the slates and limestones which occupy the northern part of Lake Memphremagog; and, extending through parts of Oxford, and Brompton, cover a considerable area in the contiguous parts of the Townships of Windsor, Wotton, Ham and Stoke. These unconformable rocks overlie and conceal a large portion of the strata of the third synclinal; but along the eastern limit of this are exposed the copper deposits of Ascot, Ham, and Garthby."

Roughly speaking these three groups of deposits, some of which may be developed into mines, contain the necessary elements of a favourable smelting mixture. In the first group are the calcareous ores of Upton and Acton. In the second the silicious and aluminous ores in the slates of the Quebec group. The leanest are suitable for concentration to a higher grade. The richer would bear transportation to a central smelter. In addition to the ores of Harvey Hill, others of the group worthy of examination are the mines still owned by the Megantic Mining Company, in Inverness, New Ireland, and Halifax; and also the Viger Mine and other mines in Chester and St. Armand counties. The third group would yield the essential element of sulphur, without which economical smelting could not be conducted. Such a scheme would, of course, require much preliminary study, prudent development work, and then abundant capital for its realization, should the study and development work justify this third step. Singly, the deposits are probably too small to be self-supporting, and their ores are unfit for isolated treatment, whereas consolidated there may be the material for a successful enterprise.

AN ENGLISH GOLD STAMP BATTERY IN SOUTH AFRICA.

By FRANK C. PERKINS.

The accompanying illustration shows the arrangement of a 120-stamp mill sent out to South Africa by the Sandycroft Foundry Company, Limited, of Chester, England, having stamps of a falling weight of 1,250 pounds. This gold stamp battery is in operation at Johannesburg in South Africa and is constructed on the high bank principal. It is stated that this type of mill is the one most in use at the present time in South Africa, and, it is maintained, possesses many advantages over other forms in operation in that country.



Large numbers of grinding pans are utilized as constructed in this English works, instead of using tube mills. These grinding pans for regrinding after milling are said to cost considerably less than tube mills and are held to be equally effective. Whether these grinding pans will ever supersede tube mills is questioned by many mining engineers, but in the meantime their operation is being watched with interest.

* The Geological Survey Report for 1863, page 709.

MINERAL PRODUCTION OF BRITISH COLUMBIA IN 1909.

Annual Report of the Minister of Mines.

The annual report of the Minister of Mines for the year ended December 31, 1909, being an account of mining operations for metalliferous minerals, coal, etc., in the Province of British Columbia, has been issued. Some of the statistical tables give the total mineral output of the province to the end of 1909, while others show in considerable detail the actual mineral production of last year, based on smelter and mill returns. Comparative tables exhibit the production of separate minerals during four years, 1906-1909, thus illustrating by comparison the progress made in productive mining in that period.

Table I. shows the total gross value of each of the chief mineral products mined up to the close of 1909. From this it will be seen that of the aggregate of \$347,820,584, coal mining has produced the highest individual total amount, \$102,904,261; next in importance is placer gold, with a total of \$70,673,103, and then copper at \$55,871,893. If placer and lode gold be taken together, a total of \$125,950,790 is obtained, thus placing this mineral at the head of the list in regard to total value of production. The figures for the several minerals appear below:

TABLE I.—Total Mineral Production for all Years to 1909, Inclusive.

Gold, placer	\$ 70,673,103
Gold, lode	55,277,687
Total gold	\$125,950,790
Silver	29,850,586
Lead	23,259,255
Copper	55,871,893
Other metals	890,699
Total metals	\$235,823,223
Coal and coke	102,904,261
Building stone, bricks, etc.....	9,093,100

Aggregate value of production \$347,820,584

Table II. shows the value of the mineral production of the province for each individual year from 1890 to 1909, both years inclusive, during which period the value increased nearly ten-fold. Table III. presents in graphic form the facts shown in figures in the tables, and demonstrates, to the eye, the rapid growth of lode mining, also the fluctuations to which it has been subjected.

Table IV. gives a statement in detail of the quantities and value of the different mineral products for the years 1907, 1908, and 1909. This table follows:

TABLE IV.—Quantities and Value of Mineral Products for 1907, 1908, and 1909.

Customary Measure.	1907		1908		1909	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer.....Ounces.....	41,400	\$ 828,000	.....	\$ 647,000	.....	\$ 477,000
Gold, lode.....Ounces.....	196,179	4,055,020	225,582	5,282,880	238,224	4,924,090
Total gold .....	.....	\$4,883,020	.....	\$5,929,880	.....	\$5,401,090
Silver.....Ounces.....	2,745,448	1,703,825	2,631,389	1,321,483	2,532,742	1,239,270
Lead.....Pounds.....	47,738,703	2,291,458	43,195,733	1,632,799	44,396,346	1,709,259
Copper.....Pounds.....	40,832,720	7,166,544	47,274,614	6,240,249	45,597,245	5,918,522
Zinc.....	.....	.....	.....	270,000	.....	400,000
Total metallic.....	.....	\$17,044,847	.....	\$15,394,411	.....	\$14,668,141
Coal.....Tons, 2,240 lb.	1,800,067	6,300,235	1,677,849	5,872,472	2,006,476	7,022,666
Coke.....Tons, 2,240 lb.	222,913	1,337,478	247,399	1,484,394	258,703	1,552,218
Building materials, etc.....	.....	1,200,000	.....	1,100,000	.....	1,200,000
Total value of production.....	.....	\$25,882,560	.....	\$23,851,277	.....	\$24,443,025

Table V. shows the respective proportions of the mineral production made in each of the districts into which the province is officially divided. It will be observed that Yale (Boundary) district continues to hold the honour of first place on the list. The Coast district, which in 1908 was third, last year changed places

with West Kootenay, and came second. East Kootenay was again fourth. The Coast and East Kootenay districts obtain a considerable proportion of their output from coal mines situated within their respective limits, whereas in the other districts the production is almost entirely from metal mining.

TABLE V.—Production of Mineral by Districts and Divisions.

Names.	Divisions.			Districts.		
	1907	1908	1909	1907	1908	1909
Cariboo District .....	.....	.....	.....	\$ 360,500	\$ 405,000	\$ 247,000
Cariboo Mining Division.	\$ 306,500	\$ 355,000	\$ 220,000	.....	.....	.....
Quesnel Mining Division.	44,000	30,000	12,000	.....	.....	.....
Omineca Mining Division.	10,000	20,000	15,000	.....	.....	.....
Cassiar District .....	.....	.....	.....	572,809	298,234	234,498
Est Kootenay District .....	.....	.....	.....	5,548,880	4,802,680	4,766,215
West Kootenay District .....	.....	.....	.....	4,792,976	5,448,224	5,169,749
Fraser Valley Division	364,868	422,181	617,340	.....	.....	.....
Nelson Division	614,395	462,836	584,955	.....	.....	.....

Slocan Division	619,842	676,580	954,737	.....	.....	.....
Trail Creek Division (Ross-land)	3,049,702	3,713,392	2,875,084	.....	.....	.....
Other parts	144,169	173,235	137,633	.....	.....	.....
Lillooet District .. . . . .	.....	.....	.....	.....	15,721	13,779
Yale District (Boundary) .. . . . .	.....	.....	.....	.....	8,444,326	7,649,963
Osoyoos, Grand Forks & Greenwood Divisions	8,354,995	7,545,380	7,501,046	.....	.....	.....
Similkameen & Nicola Div.	56,564	101,583	225,210	.....	.....	.....
Yale Division	32,767	3,000	2,000	.....	.....	.....
Coast District (Nanaimo, Alberni, Clayoquot, Quatsino, Victoria) .. . . . .	.....	.....	.....	.....	6,147,348	5,233,397
						6,280,631
					\$25,882,560	\$23,851,277
						\$24,443,025

Other tables, not here reproduced, are as follows:

No. VI. gives the statistical record of the placer-gold mines of the province from 1858 to 1909, inclusive, and shows a total production of \$70,673,103. The output for 1909 was less than that for 1908 by about 26.2 per cent.

No. VII. relates entirely to the lode mines and shows the quantities and value, respectively, of the various metals produced each year since the beginning, in 1887, of lode mining in the province. The gross value of the products of these mines (excepting zinc, which is not included in this table), is \$164,259,421. The value of the production of lode minerals in 1909 was rather less than in 1908.

No. VIII. contains the statistics of the production of the coal mines of British Columbia. The total quantity of coal mined to the end of 1909 was 29,629,025 tons (of 2,240 pounds), valued at \$92,010,796. In these figures the quantity of coal used in the manufacture of coke is not included. The production of coal was commenced in 1895; the total quantity made to the end of 1909 was 2,032,890 long tons, valued at \$10,893,465. The average selling prices used in calculating the value of the coal and coke production prior to 1907 were \$3 per long ton of coal and \$5 per ton of coke. For the last three years the prices used have been \$3.50 for coal and \$6 for coke.

No. IX. exhibits details of production of the mines of the province (excepting the coal mines) for four years, 1906-1909, and the districts in which such production was made. The tonnage of ore mined in each district, with its metallic contents and market value, is shown. The total tonnage of ore mined in 1909 was 2,057,713 tons, having a gross value, including building materials, of \$15,868,141. This compares with 2,083,606 tons, valued at \$16,494,411 in 1908. The percentage of tonnage and value derived from the various districts of the province last year were as under:

	Tonnage, p.c.	Value, p.c.
Yale (Boundary) district	71.03	53.92
Trail Creek mining division ...	11.55	20.84
Fort Steele mining division ..	7.28	9.65
Slocan district	1.37	4.02
Coast district	1.92	2.18
Other parts of province	6.85	9.39
	100.00	100.00

No. X. compares graphically the output of mineral products of British Columbia with that of similar products in all the other provinces of the Dominion, and shows that in 1909 this province produced in the minerals shown an amount equal to about 67.8 per cent. of that of all the other provinces of Canada combined.

PROGRESS OF MINING.

From the comments of the Provincial Mineralogist on the Progress of Mining the following information has been taken:

While the value of the mineral production of the province in 1909 was less than in the years 1906 and 1907, it was considerably greater than that of any earlier year than those.

The tonnage of ore mined, exclusive of coal, was 2,057,713 tons, which quantity was a decrease as compared with the tonnage for 1908 of 25,893 tons, or 1.24 per cent. This tonnage was produced by the various districts in the proportions shown by the next following figures: Yale district, Boundary mines, 71.03 per cent.; West Kootenay district, Rossland mines, 11.55 per cent.; East Kootenay district, mines in Fort Steele division (chiefly the St. Eugene), 7.28 per cent.; Coast district, 1.92 per cent.; all other parts, 8.22 per cent.

The number of mines from which shipments of ore were made was 89, and of these only 52 shipped more than 100 tons each during the year, while but 32 shipped in excess of 1,000 tons each. Of the latter, 8 were in Nelson mining division, 5 in the Boundary, 5 in Ainsworth division, 4 in Slocan district, 3 in the Coast district, 3 in Trail Creek (Rossland) division, 2 in Fort Steele division, and one each in Trout Lake and Queen Charlotte divisions.

The number of men employed were: In metalliferous producing mines, 3,037 (2,048 below and 989 above ground); in mines not shipping ore, 217 (136 below and 81 above ground); total, 3254. A mine employing say 12 men for four months was credited with four men for 12 months, so that the total above given is less than the actual number of men who worked in the mines during the year. The number employed at the coal mines was 6,418, this including 215 white boys, and 672 Chinese, Japanese, and Indians. The official figures of all employed at the mines of the province therefore give a grand total of 9,672. Although it is not so stated in the report, it is quite probable the 1,000 or more men employed at the several smelting works are not included.

Coal.

The coal produced was mined chiefly by three companies, namely, the Wellington Colliery Company and the Western Fuel Company, on Vancouver Island, and the Crow's Nest Pass Coal Company, in southeast Kootenay; these companies together produced about 88 per cent. of the total coal mined. Of the smaller collieries, those on Vancouver Island were the Pacific Coast Coal Mines, Limited, with about 70,000 tons, and the Vancouver-Nanaimo, with 10,000 tons; in the Nicola district, the Nicola Valley Coal & Coke Company's production was about 62,000 tons, and the Diamond Vale Company's about 1,700 tons; in the Crow's Nest district the

Hosmer and Corbin collieries each produced about 60,000 tons. The gross output of coal was 2,400,600 tons of 2,240 pounds), of which 998,494 tons was sold for consumption in Canada; 741,646 tons exported, mostly to the United States; 260,554 tons burned under colliery boilers, etc.; 394,124 tons used in making coke, and 5,782 tons added to stock. The quantity of coke made was 258,703 long tons, of which 210,884 tons was sold for use in Canada; 40,629 tons exported, nearly all to the United States, and 7,199 tons added to stock. The production of coal was the largest for any year since coal mining was commenced in the province; that of coke was second only to that of 1905, when 271,785 long tons was made.

Gold.

The production of placer gold was \$477,000, as against \$647,000 in 1908, and this was the smallest amount produced in any year since 1894. The decrease in output was attributable partly to the short water supply last season.

The value of lode gold was \$4,924,090, a decrease of \$358,790 as compared with 1908. Nelson, Boundary, and Coast districts each produced more lode gold, but the decrease in Rossland camp was larger than the total of the increases in other parts of the province. About 86.5 per cent. of the lode gold was recovered from smelting ores also copper-bearing; the remaining 13.5 per cent. was from ores treated in stamp mills, etc. The larger stamp mills operated last year were those of the Hedley Gold Mining Company at Hedley, Similkameen, with 40 stamps; Granite-Poorman mill, near Nelson, 20 stamps, and Queen mill, Sheep Creek, 20 stamps. There are two small mills at Sheep Creek mines, one of which, at the Nugget mine, with four stamps, was worked nearly all the year.

Silver.

The silver produced totalled 2,532,742 ounces, a decrease in quantity of 98,647 ounces and in value of \$82,213, as compared with 1908. About 98.2 per cent. of this was from silver-lead ores and the remainder from copper-silver ores. The Slovan district—including Ainsworth, Slovan, Slovan City, and Trout Lake divisions—produced about 50 per cent. of the total, and Fort Steele division of East Kootenay 23 per cent., all from argentiferous galena ores.

Lead.

Lead showed a production of 44,396,346 pounds, this being an increase of 1,200,613 pounds in quantity and \$76,460 in value over that of 1908. Mines in Fort Steele division (chiefly the St. Eugene), produced nearly 61 per cent. of this total; those in Ainsworth and Slovan, 34 per cent., and in Nelson and Trout Lake divisions, 5 per cent.

Copper.

The amount of copper, placed at 45,597,245 pounds, was less in quantity by 1,677,369 pounds, and value by \$321,727 than in 1908. These figures do not take into account smelter charges or deductions, but show the copper contained in the ore smelted. There was a slight increase in the Boundary district and Nelson division, but a heavy falling off in Rossland camp and the Coast district. The proportions of production of districts were: Boundary, 89.04 per cent.; Rossland, 7.70 per cent.; Coast, 2.84 per cent.; and Nelson, 0.42 per cent. The average assays of copper in ores of the several districts, based upon copper recovered, were: Boundary, 1.41 per cent.; Coast, 1.5 per cent.; Rossland, 0.75 per cent.

Iron and Zinc.

No iron ore was shipped and very little mined, there having been no market in 1909 for iron ore from the province.

About 10,000 tons of zinc ore and concentrates was sold in 1909, the zinc contents ranging from 38 to 42 per cent. The Lucky Jim, Slovan, was the only mine that shipped zinc ore; it sent out 4,700 tons averaging 48 per cent. zinc. The Whitewater group, Ainsworth division, produced 4,600 tons of zinc concentrates, containing 38 to 43 per cent. zinc, also silver from 15 to 25 ounces per ton. Mills of other mines produced zinc concentrates of similar value, but little of their production was sold.

Building Materials, Etc.

Of building materials, etc., the chief production was in granite and sandstone, bricks, pottery, lime, and portland cement. Much building stone was supplied to Coast cities, in which many substantial buildings were erected. Three marble quarries, one on Vancouver Island and two near Kootenay Lake, were worked, and one of the latter sent out about \$30,000 worth of marble, largely to prairie cities. The estimated production of red bricks was 40,000,000. Some excellent fire bricks and fancy building bricks were also manufactured. Pottery products were estimated at \$100,000. Portland cement was made near Victoria, Vancouver Island; some 238,000 barrels was the output, valued at \$360,000.

FEATURES OF THE REPORT.

Prominent features of the report, other than the statistical tables and accompanying comments of the Provincial Mineralogist (Mr. Wm. Fleet Robertson) on the progress of the year, are accounts of visits paid by that official to several mining districts, and his observations on matters and things that came under his personal notice. Among the districts he visited were the Queen Charlotte Islands; the partly developed and producing coal mining district in the Crow's Nest Pass country, and the important though undeveloped coal areas in the upper Elk River district, computed by Mr. D. B. Dowling, of the Dominion Geological Survey, to embrace 140 square miles of coal-bearing country, with a probable workable coal content of 100,000,000 tons per square mile; the metalliferous mineral region in East Kootenay lying between Golden and Field, on the Canadian Pacific main line railway, and the vicinity of Moyie Lake, on the Crow's Nest Railway, on the south; the Duncan River district, in Ainsworth division, and Sheep Creek camp, in Nelson division. Much information is given concerning these several regions, of parts of which there was not on record any official information obtained in recent years. The illustrations of places and scenes in some of these little-known parts add to the value of the report.

Several official reports on the disastrous explosion that took place at the Wellington Colliery Company's Extension colliery, Vancouver Island, last October, when 32 men lost their lives, are printed; with these are diagrams and other illustrations of especial interest to men connected with coal mining.

The bulletin by Mr. Herbert Carmichael, Provincial Assayer, issued by the Bureau of Mines last winter, is reprinted in the annual report. At this time, when Portland Canal district, which it describes in some detail, is attracting much attention, this will be of particular value.

As is usual with the British Columbia Government printing office, the printing of the report, and the finish

of the half-tone illustrations, are very creditable. The reproductions of photographs are superior, and beside these decidedly ornamental illustrations, there are graphic tables, diagrams, maps, etc., to also add to the usefulness of the report. It is to be regretted that it was not practicable to get it ready for issue earlier in the year, but, though late, it will be found of much value throughout the wide field over which it will be distributed.

MINE-RESCUE STATIONS IN BRITISH COLUMBIA

With a view to the early establishment of mine-rescue stations in British Columbia, as required by the "Coal Mines Regulation Act" in force in that province, the Provincial Government has ordered Draeger oxygen breathing helmets and all requisite accessories for the full equipment of three mine-rescue stations, one of which will be established at Hosmer, Crow's Nest Pass district, which is about the most central place that could be chosen in that important coal field, and two on Vancouver Island—one at Cumberland, where is situated the most northerly of the big collieries in operation on the Island, and the other at Extension, where there was a serious and fatal disaster last October. As railway connections exist between Hosmer, and Michel and Corbin in one direction, and Hosmer, and Coal Creek and Carbonado in another, the advantage of that point for one of the Government stations is apparent. Similarly, there are railway connections between Extension, and South Wellington and Nanaimo, on Vancouver Island, so here again it is manifest that the officials of the Provincial Bureau of Mines have been giving the subject of advantageous situation of the stations their careful attention. It is planned to fit up railway cars, where practicable, as storage rooms for the Draeger apparatus, so that on emergency there will be a minimum of delay in the transportation of apparatus and those trained in its use to the scene of operations wherever their services shall be required.

Last March the Legislative Assembly of British Columbia amended the "Coal Mines Regulation Act," an important addition to which was the following section:

"82a. There shall be established by the owner, agent, or manager of every colliery to which this Act applies such number of oxygen helmets, or some such form of mine-rescue device as may be approved by the Minister of Mines.

"Such mine-rescue apparatus shall be constantly maintained in an efficient and workable condition, and shall in all cases be so stored, or placed about the mine, as to be always available for immediate use.

"The Lieutenant-Governor in Council may, from time to time, establish mine-rescue stations for the purpose of supplementing, in case of need, the colliery installations of mine-rescue apparatus, and also for the purpose of training the holders of Certificates of Competency under this Act in the use of such mine-rescue device as may be approved by the Minister of Mines; and it shall be incumbent on the owner, agent, or manager of every operating mine to which this Act applies to retain such number of employees trained in the use of such established mine-rescue apparatus as the Chief Inspector of Mines may deem sufficient:

"Provided that in cases of emergency such stations shall be available for the use of any trained corps of mine-rescuers, duly qualified medical practitioners, or corps trained in the work of first aid to the injured.

"This section shall come into force upon proclamation by the Lieutenant-Governor in Council."

Circumstances have since been such that the Lieutenant-Governor in Council has not yet issued the proclamation requisite to bring this section into force, but meanwhile much active interest has been taken in the subject of mine-rescue by the Provincial Department of Mines. The Deputy Minister (Mr. R. E. Tolmie), Provincial Mineralogist (Mr. Wm. Fleet Robertson), and Chief Inspector of Mines (Mr. F. H. Shepherd) have visited Seattle, Washington, on different occasions, to see the work being done at the United States Geological Survey mine-rescue training station there in conjunction with the Washington State authorities and the University of Washington. Information concerning this training station was printed in the CANADIAN MINING JOURNAL of June 1 (pp. 334-5). There is little doubt the proclamation provided for in the last clause above quoted will shortly be gazetted, and by that time the Provincial Government will probably have received the apparatus it has ordered and have established its mine-rescue stations.

It is significant that the only company operating in the province that has anticipated the coming into law of the provisions requiring that mine-rescue apparatus be obtained and be available for immediate use, is the Western Fuel Company, the chief shareholders in which (if not all of them) are residents in the United States. The Canadian companies appear to be waiting until the law compels them to make this provision for mine-rescue, and perhaps life-saving, purposes.

Last February the Western Branch of the Canadian Mining Institute passed a resolution favouring the remission by the Federal Government of customs duty on mine-rescue apparatus, and this resolution was forwarded to Hon. Wm. Templeman, Minister of Mines. It would be interesting to hear that Minister explain to the coal miners of Canada what he has since done towards facilitating in this way the provision of life-saving apparatus, in which they are so vitally interested.

CANADIAN MINING INSTITUTE.

PROPOSAL TO REPRINT VOLS. I. TO V. OF THE JOURNAL.

Volumes I. to V. (inclusive) of the Journal of the Canadian Mining Institute being out of print, the Council contemplate publishing a revised edition of the five volumes in question provided a sufficient number of subscriptions thereto are received. It is proposed to reprint the five volumes in question in two volumes, the first to include Vols. I., II. and III. of the Journal, and the second, Vols. IV. and V. Each volume will comprise about five hundred pages.

The subscription price based on the actual cost of the undertaking has been placed at twelve dollars.

The oil companies that control the great Baku district of southern Russia are substituting electric power for steam.

Great Britain produces 1,900,000 tons of salt a year, all Europe less than 5,000,000.

HAMMER DRILLS IN OVERHAND STOPING AND RAISING.

By H. B. WILLIAMS, Associate.

Paper read before the Institution of Mining and Metallurgy.

The numerous advantages obtained by the recent substitution of hammer drills in place of hand labour and ordinary piston drills having now been sufficiently demonstrated by means of exhaustive trials and practical operation in stoping and raising at the Granite Gold Mines, British Columbia, I herewith append an account of my experience of their performance.

Overhand or back-stoping only is practised at these mines, the reef consisting of hard quartz from 8 in. to 5 ft. in width, containing 2 per cent. to 10 per cent. of sulphides of iron and arsenic, while the country rock is a dark closegrained granite. The vein underlies at angles varying from 35 per cent. to 50 per cent.

Figures being available to show the cost of stoping as practised in previous years at the mines, this paper is written with the object of a general comparison of results by the various methods employed, and in particular with regard to those obtained with the hammer drill. The drill found most efficient is the Waugh stoping hammer drill, a 2-in. cylinder, valve machine. The principal wearing parts are the piston hammer, costing \$4.00, the chuck \$3.50, tappet \$2.00, and complete valves \$10.00.

A general description of the mechanism of the machine in question is as follows:

Referring to Figure 1, the drill is 4 ft. in length, weighing 60 lbs., its greatest diam. being at the barrel A, $3\frac{1}{4}$ in. The cylinder is 2 in. in diam., while the automatic telescope air pressure feed (B) allows of an extension of 24 in. The hammer (C) is a piston the blow of which is regulated by a valve (D); the hammer strikes a tappet (E), the latter in turn delivering the percussion to the end of the shank of the drill steel, which is held in alignment with the drill in a chuck (F) of hardened steel. Rotation of the machine and consequently of the drill steel is effected by the hand lever (G). With an air pressure of 60 lbs, 1,000 blows per minute are struck by the hammer, its stroke being $2\frac{1}{2}$ in.

In operation underground, a starter having been placed in the chuck, and the hose coupled to its connection, the hammer drill which, as previously stated, is designed for the boring of uppers in overhand stoping and raising only, is set up with the extension end on a rough sollar (Fig. 2). This sollar may be laid on broken ore or across the stope timbers at a convenient distance from the face of the stope, and the machine is so aligned as to take the best advantage of the heads occurring in the ground to be broken.

Air now being turned on, the extension piston automatically brings the bit of the drill steel forward into contact with the rock, percussion of the drill steel by the tappet commences, and the rotating lever being operated by the machine man, pitching and subsequently drilling of the hole proceeds to the depth required.

Holes up to 4 ft. in depth are bored by these machines. The drill steel used is of light cruciform section in lengths of 18, 27, 36, 45, and 54 inches, allowing 9 in. changes for each bit. It has been found important to forge and harden the drill shanks with care, 1 in. square, where they fit in the chuck, as it is at the chuck that most wear and tear occurs with these machines.

It has been suggested to myself that with slight wear only of the chuck and of the shank of the drill steel, the alignment of the machine itself and the drill steel would not coincide, and in consequence there would be a tendency to "fichured" holes; experience at the Granite Mine has proved to me that the number of fichured

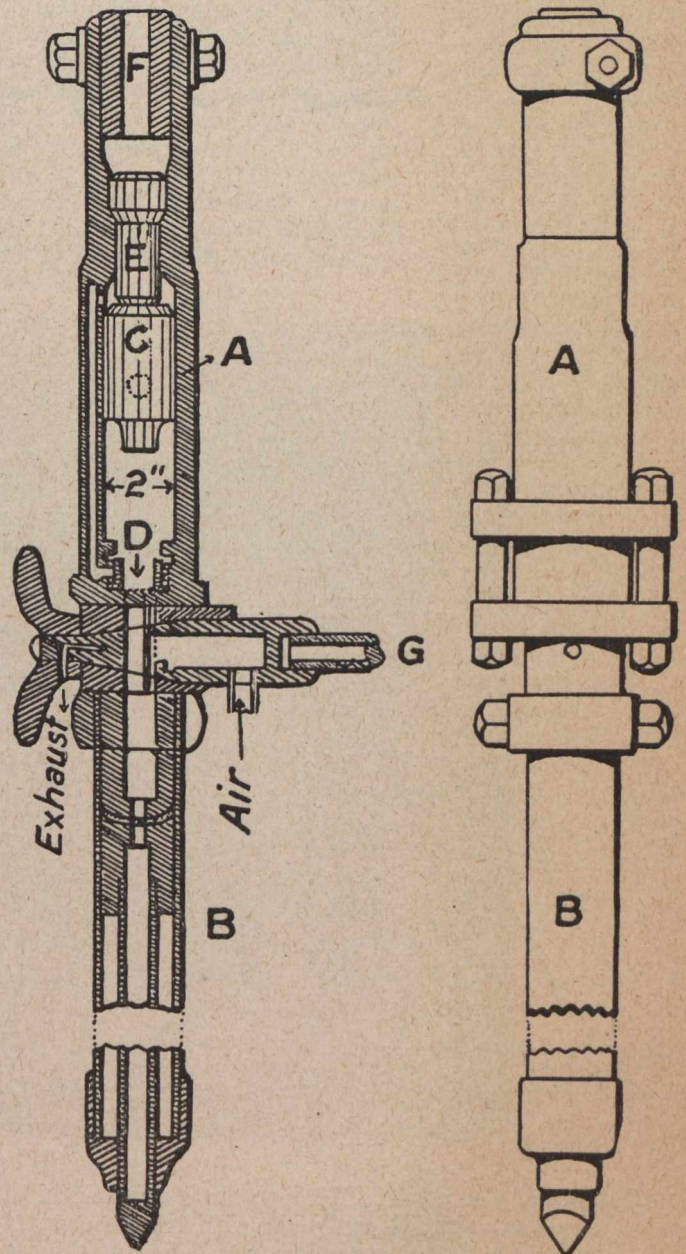


FIG. 1.

holes is small though the ground is "heady"; difficulty is experienced only when the drill bores into soft gouge which occasionally occurs on the hanging wall.

It has been found more satisfactory to avoid the boring of holes at an angle of less than 35 degrees from the horizontal. At smaller angles the dust does not clear

from the holes by gravity, and owing to the unsupported length of the machine and drill steel the leverage is sufficient to cause the drill steel to break, usually close to the chuck, and to wear the hole in the chuck itself unduly; considerable additional friction and consequent loss of boring efficiency is also caused by the boring of flat holes. With a reef underlying at over 35 degrees, as is the case with the Granite Mines, there is only occasional necessity for a low-pitched hole.

Machine men running the hammer-drills are instructed to attend carefully to the lubrication of their machines, which is essential owing to the somewhat delicate

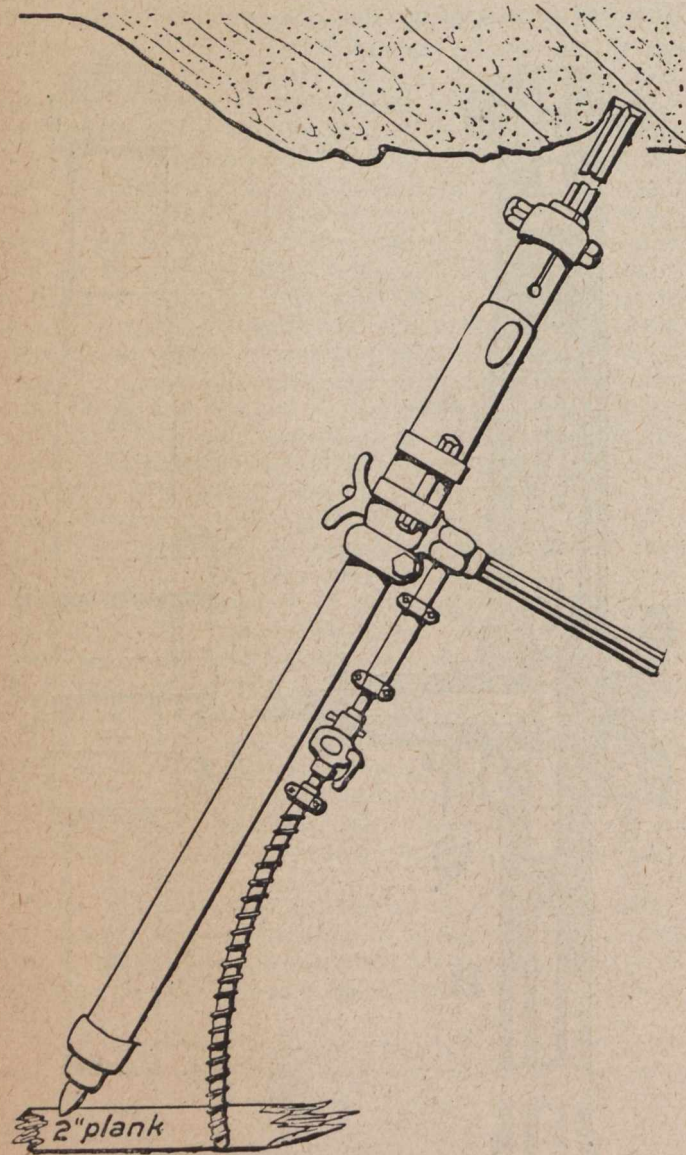


FIG. 2

mechanism of the valves. Recently an automatic lubricator has been supplied combined with the air-connecting plug, which now ensures constant oiling of the machine for a full shift without replenishing the oil-chamber.

I now propose to deal with the advantages of the hammer drill over piston drills manifested in the tests underground, which led to the final adoption of the former at the mine for stoping and raising.

The lightness and general handiness of the 2-in. hammer drill, its weight being only 60 lbs., against the 125

lbs. of the 2-in. piston stoping drill, is a point in its favour.

There is a considerable saving of time in setting up. In a shift of eight hours, it can be safely estimated that the loss of boring time in setting up, changing steel, and taking down a piston drill is two hours; with the hammer drills half-an-hour only per shift is sufficient, less time is lost in changing steel, there being no U-bolts, bars, or mountings to manipulate.

Inexperienced hand-labour miners can learn to run the hammer drills in a few shifts, a great advantage in a country where good machine men are difficult to procure.

Greater drilling efficiency has been obtained. With the small 2-in. one-man piston drill, a shift's work comprising a total footage bored of between 25 and 30 ft. was considered satisfactory, whereas the hammer drills bore ten 4-ft. holes, or an aggregate of 40 feet per shift. The bits of the drill steel are not dulled by the quick, light blows of the hammer drill to the extent which occurs with the heavier blows from the piston drill.

Owing to the fact that the hammer drill is so compact and requires no bar or mountings, holes may be bored to take the greatest advantage of slips in the ground in low stopes, and greater efficiency in breaking ground has resulted.

The construction of the hammer drill renders its adaptability most evident for carrying considerably lower stopes than with the piston drill, a great saving of cost in stoping narrow reefs, such as those of the Granite Mines.

I have been struck with the small quantity of fine dust made by the hammer drill in the stopes and rises. I account for this improvement over piston drills by the fact that there is no churning movement of the drill steel in the hole, as is the case with the piston drills, the bitt of the drill steel held continually in the bottom of the hole while boring. The air is exhausted back from the face of the stope and no air can escape at the chuck end of the machine. It may also be noticed that the hammer drills possess the advantage of producing coarser cuttings than the piston drill.

In air consumption I have found that with a receiver pressure of 80 lbs., there is only a slight advantage in practice in favour of the 2-in. hammer drill over the 2-in. piston drill.

Having related the advantages of the hammer drill over the piston drill, as proved by their successful operation for some months past at the Granite Mines, I now propose to deal with the reduction of costs in stoping effected by their use.

A comparative statement of stoping costs under various methods is as follows:

Stoping by hand labour	\$3.50 per ton.
Stoping by 3 1/4 in. rock-drill (piston)	2.90 per ton.
Stoping by 2 1/4 in. rock drill (piston)	2.08 per ton.
Stoping by 2 in. hammer drill	1.53 per ton.

In the above statement no allowance is included for development charges, compressed air, or depreciation of plant generally. In reference to this point, however, it may be of interest to mention that the total costs, including all charges of mining transportation, milling and realization, etc., at the Granite Mines, have recently been reduced from \$5.32 to \$3.25 per ton, although the high cost of labour and supplies locally shows no diminution, a result mainly attributable to the adoption of the hammer drills.

It must be borne in mind, in considering the value of the above figures in comparison with larger mines' costs,

that they refer to a mine equipped with a plant capable of crushing 1,500 tons per month only, and that the greater proportion of the stopes worked recently carry a reef with an average width of only 15 inches.

On account of the simplicity and small number of moving parts, the repairs and general upkeep of the hammer drills work out at approximately only \$5.00 per month, which compares favourably with these charges in the case of the piston drills. Owing to its compact tube-like design, the hammer drill withstands the invariably rough handling without the breakages so common with piston drills.

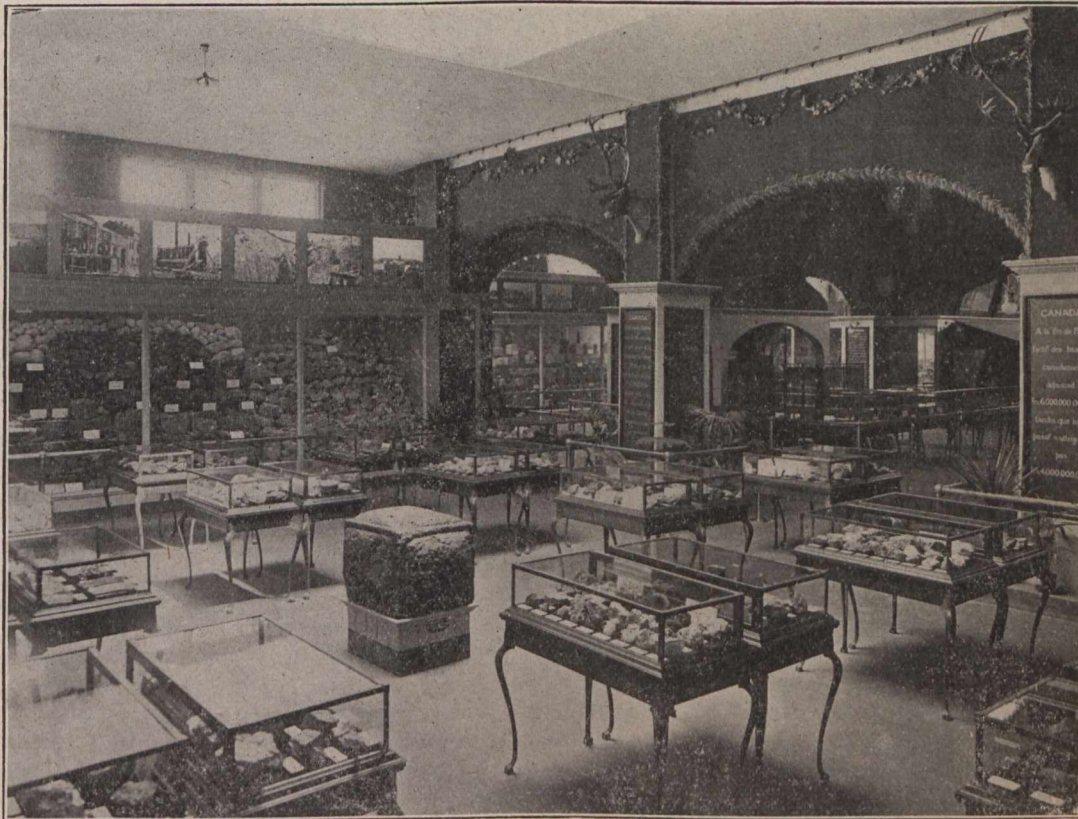
The advantages in general handiness, increase in progress and consequent reduction of cost in raising with the hammer drill are even more marked than in the case of stoping by its use.

CANADIAN MINERALS AT THE BRUSSELS EXHIBITION.

(Written specially for the CANADIAN MINING JOURNAL.)

In view of the fact that Canada made such a large display of minerals at the Liege Exhibition, in 1905, it is worthy to note the increased and intelligent interest

Canada's undeveloped water powers, coupled with the immense coal areas, represent to them an asset of reserved energy that will be the greatest factor of development in the years to come. To enter into details of the installation of the mineral exhibit would require much time and space. All the principal mining interests are fully represented. As an educational section this one is not equalled in the entire exhibition. Through the great coal measures of Nova Scotia we pass to New Brunswick, with its shales and large gypsum deposits, then to Quebec rich in asbestos and other minerals; Ontario, with its silver and nickel mines unequalled in the world; Manitoba and Saskatchewan, with structural materials and natural gas proven at a few points; Alberta, rich in coal, anthracite and bituminous. British Columbia's large areas of coal on the coast and in the interior valleys, with the rich deposits of gold, silver, lead and copper ores throughout the province, give it prominence over the others. The interested visitor, after following the mineral occurrences as arranged, looking at the map of the Dominion, sees that only about one-half of the rim has been touched. During my visit to Brussels I came in touch with a number of persons interested in the development of some of the Canadian properties; they spoke in high terms of



this branch of our natural resources is arousing at the present exhibition.

Much wonder is expressed at the rapid development of the Dominion, the variety of its minerals and the vast extent of territory that is open to the prospector. But many predictions of the extent to which the mineral industry will be carried, seem overdrawn.

Those who have worked in Belgium and other countries with the knowledge of what has been done under most unfavourable conditions grant to Canada greater possibilities than even we ourselves appreciate.

the exhibit in the Canadian section, and of the good work the government was doing through this medium.

So long as your government can come to us, as in the case of Liege, 1905; Brussels, 1910, and show that the statements made have been carried into actual fact, we will be mutually benefitted. In 1904, your mineral production was a little over \$60,000,000.00, of which you were proud. For last year you show an output of over \$90,000,000.00. These are the facts that impress us most.

Since 1905 much Belgian capital has found its way into legitimate mining in Canada, and recently large in-

terests have been acquired by us in the Pictou coal field, to which point not a few miners from Belgium will find their way.

Your new railway lines will also place mining on a better footing and bring out new and valuable properties now unworked. As I understand it, the finding of your most valuable mineral deposits is attributable to railway construction, thus giving credit to the new lines building it is possible to anticipate newer fields and a larger output in the near future.

THE DINNER HOUR.

By JOHN RAVENOR BULLEN.

We slacked her down at the dinner hour and bundled out under a tree,

Did Solomon Jopp and "Hurricane Hank," and Joe, which is the same to me.

"You can say what you mind," said Solomon Jopp, as he fanned his face with his hat,

"This drillin' fer oil's a pretty fine game—but you never knows where you're at."

"That's right enough," said "Hurricane Hank," as he swallowed a chunk of meat

And savagely spat at a yellor wasp that buzzed in the blazin' heat.

"There's ways," said he, "as I've always said, for makin' a mint of gold,

But it's always the ones as should get the luck, it's always them as gets sold."

"It's true," said Solomon Jopp, "it's true, we never have had no chance"

As the wasp stung Hank on the tip of his ear, and he danced a Salome dance.

"Now you calls to mind," said Solomon Jopp, "the man from Jingermeror,

Who comed with a million of money and meant to make a million more.

He'd twenty-six alphabets after his name and the devil knows what beside,

And a portable hencyclopedia called 'The Oil-well Driller's Guide.'

He staked out the territ'ry down to the west and hired out a triplet of rigs,

And the whole blamed country near died with delight, from Gilligan down to Giggs.

Well, he punctured the earth like a pepper-pot lid with a hundred of holes and more,

And he punctured a hole in his million of gold ere he left for Jingermeror."

"Correct," said "Hurricane Hank," "correct," as he sprawled in the shade of the tree

And chewed big chunks of tobacco down on the top of the cakes and tea.

"On the nethermost hand," said Solomon Jopp, as he blinked a dusty eye,

"There was Jonathan Blob, the laziest squab, which none will ever deny.

He drilled one well in Tillarmeroo and now he's a big-money shark,

And he's counting his dollars all day and all night, seven million ain't far off the mark.

He's rigged all the time in the slickest of styles, 'nough to make a blind quadriped jump,

Wears a shiny top-hat, drinks his glass of champagne—him!! the darnedest that ere wrenched a pump.

You can say what you mind," said Solomon Jopp, as he harpooned his knife through his hat,

"This drilling fer oil's a pretty fine game, but you never knows where you'e at."

Then we cussed and cussed as we always cussed when we left the shade of that tree,

But we started her up as we always did, did Solomon, Hank, and Me.

PERSONAL AND GENERAL.

Mr. Thomas Kiddie has returned to Vancouver from a visit to a deposit of magnesite and some gold properties in Atlin district, B.C.

Mr. Elias Rogers, of Toronto, president of the Crow's Nest Pass Coal Company, Limited, visited Vancouver and Victoria, B.C., during July.

Mr. Lionel E. Hill has been appointed assistant to Mr. Ernest Levy, of Rossland, B.C., manager for the Le Roi No. 2, Limited, and the Van Roi Mining Company, Limited.

Mr. O. B. Smith, superintendent of the Granby Company's mines at Phoenix, B.C., lately visited the Hidden Creek Copper Company's property at Goose Bay, Observatory Inlet, B.C.

Mr. Andrew Bryden, formerly manager of the Dunsuir colliery at Extension, Vancouver Island, B.C., is to superintend the work of opening new coal mines in the Nicola district for the Coal Hill Syndicate.

Mr. E. Hodgson, of Victoria, B.C., well known in connection with coal mining on Vancouver Island, recently spent a short time in the Lethbridge district, Alberta, on business connected with coal and oil prospecting.

Mr. Frederick H. Morley, M.E., of Denver, Colorado, U.S.A., has been commissioned to obtain information relative to mining properties in Portland Canal district, British Columbia, whence he went about the middle of July.

Mr. J. L. Howard, of San Francisco, California, president of the Western Fuel Company, lately paid one of his periodical visits to his company's collieries near Nanaimo, Vancouver Island, B.C. Only recently he returned from a trip to England.

Mr. C. H. Dickie, of Duncans, B.C., managing director of the Portland Canal Mining Company, has gone to Portland Canal to witness the commencement of ore concentration operations in the mill the company expects to have running in August.

Mr. Wm. Fleet Robertson, Provincial Mineralogist, left Victoria on July 11 for the Chilcotin country, in the southern portion of Cariboo district. He will make an exploratory examination of parts of Clinton and Bella Coola mining divisions, which lie between Fraser River and the Coast, about parallel 52 to 53.

The Jeffrey Manufacturing Company, main office and works, Columbus, Ohio, are changing the location of their Denver office from No. 1711 Tremont Place, and after August 1st will occupy a commodious suite of rooms in the First National Bank Building. This company besides maintaining a large selling force in over a dozen of the leading cities of this country, also maintain a corps of engineers at their branch offices situated in the following cities: Chicago, St. Louis, Denver, Montreal, Pittsburg, Charleston, W. Virginia, Boston, New York, and Birmingham. There are also nearly 100 Jeffrey agencies in additional cities in this country and abroad.

ON THE DISTRIBUTION OF ASBESTOS DEPOSITS IN THE EASTERN TOWNSHIPS OF QUEBEC.

BY JOHN A. DRESSER, OTTAWA, ONT.

(Published by permission of the Director of the Geological Survey of Canada. Annual Meeting, Toronto, 1910)

Introduction.

At the last meeting of this Institute a short paper was presented by the writer on the mode of occurrence of asbestos and chomite in the Eastern Townships of Quebec.*

In the interval further work has been done in the area, under the auspices of the Geological Survey, and certain relations have been ascertained between the productive and the unproductive parts of the serpentine belt in which these minerals occur. It is the purpose of this paper to show some of the geological relations of the serpentine belt and how they determine the distribution of the mineral deposits, and to apply the conclusions as an aid to prospecting for and estimating the value of further discoveries. For these purposes a brief review of the district is necessary.

Review of the District.

The part of the province of Quebec which lies south of the River St. Lawrence consists of a portion of the wide flat valley, or a plain bordering the St. Lawrence, and a hilly region, extending from the plain to the boundary line between the Province of Quebec and the United States. The northeastern part of the hilly region in the Gaspé Peninsula forms the Shickshock Mountains; the southern part is generally known as the Eastern Townships. It is to the latter part of the region, and especially the portion between the St. Francis and Chaudière Rivers, that this paper relates. These rivers are about 100 miles apart, and from the area between them all the asbestos and chromite hitherto mined in Quebec has been obtained.

Series of parallel ridges running northeast and southwest are the principal features in the relief of the district. These are grouped into three principal ranges which are about twenty-five miles apart. One of these extends along the international boundary line near Lake Mégantic, a second forms the hills of Capelton, Stoke and Weedon, passing near the city of Sherbrooke, and the third forms the hills of Broughton, Leeds and Ham, and farther to the southward rises into Sutton Mountain.

Sutton Mountain, the highest point in the district, has an altitude of nearly 3,100 feet. Several other hills rise 2,500 feet or higher, and there are considerable areas which are between 1,500 feet and 2,000 feet above sea level. The St. Lawrence plain varies in elevation from 100 to 400 feet.

The district is drained by the Chaudière, Becancour, Nicolet, St. Francis and other rivers which cross the ranges of hills in a northwesterly direction and empty into the St. Lawrence. The tributaries of these rivers occupy the structural valleys between the ridges, and generally run either in a northeasterly or southwesterly direction. They frequently empty into the larger rivers by falls or rapids and so furnish some of the principal water powers of the district, such as the falls of the Magog at Sherbrooke, or the Wattopekah at Windsor Mills.

* "Mineral Deposits of the Serpentine Belt of Southern Quebec." Journal of the Canadian Mining Institute, Montreal, 1909.

The Quebec Central and the Grand Trunk Railways give easy access to the greater part of the mining district. The principal mines are near the stations of Thetford Mines, Black Lake and East Broughton on the former, and Danville, on the latter line of railway.

Mineral Production.

Asbestos (chrysotile) is the most important mineral now mined in the Province of Quebec. It comprises in value about half the total mineral production of the province and in 1907, the latest date for which full returns are available, this district furnished 84 per cent. of the world's supply.

The mineral was discovered in Canada in the early days of the Geological Survey, about 1847, and thirty years, later, 1877, it began to be commercially developed. Since that time there has been a constantly-increasing production, as may be seen by reviewing the production* of one year in each decade since the industry was begun:

Year 1878 production	50 tons value....	\$.....
Year 1888 production	4,404 tons value....	255,007
Year 1898 production	16,124 tons value....	471,131
Year 1908 production	66,548 tons value....	2 555,361

The increase in production during the last decade has also been accompanied by a marked increase in price. To quote from the returns of production by Mr. McLeish, cited above, "The statistics indicate that during the past six years there has been only a slight increase in the quantity shipped as crude, although the average price has nearly doubled; while, on the other hand, the shipments of mill stock have increased over 125 per cent., with an increase of over 50 per cent. in the average price per ton obtained."

To state this in concrete form, the average prices of crude asbestos and mill stock in 1903 were \$115.46 and \$19.79 respectively; in 1908, \$200.04 and \$29.84.

In consequence of the successful development of the industry in recent years, prospecting is active and the search for new productive areas is being vigorously prosecuted.

Geology of the District.

General.—The central parts of the main ranges of hills are composed of igneous and sedimentary rocks of early age, in part at least Pre-Cambrian. Flanking these are sediments of later Cambrian and Ordovician age, within which are isolated intrusions of granite which are believed to have been injected in Devonian time. On the southeast side of the Sutton and Leeds range of hills there is a series of basic intrusive rocks generally known as the Serpentine belt. It is in this that the asbestos and chromite deposits of the Eastern Townships are found.

Local.—The sedimentary rocks of the district are schists, slates, sandstones and quartzites of Cambrian and Ordovician age. They are highly altered rocks and much distributed in position by folding and faulting. They have a general northeasterly strike and dips at high angles.

* "The Production of Asbestos in Canada," 1907-8." By John McLeish, Chief of Division of Mineral Statistics, Department of Mines of Canada.

The igneous rocks in which the mineral deposits occur are all intrusive in the sediments. They have been injected at different times, although many of the different varieties of rock have been formed by differentiation from a single intrusion. At the contact of the intrusives with the sedimentary rocks large amounts of breccia have been formed, the sediments are baked and hardened, yet dykes are rare and there has not been any notable fracturing of the sediments. The intrusions have been gradual in their action.

The area occupied by igneous rocks is often and conveniently called the "serpentine belt," since serpentine is the rock which contains the principal mineral deposits.

Thetford, through the Townships of Thetford, Coleraine, Wolfertown, Garthby, South Ham, Wotton, Tingwick, Shipton and Cleveland. It probably also forms a large part of the serpentine belt further to the southwestward in the counties of Sherbrooke and Brome; but this area has not yet been studied in detail. The country rock of the mines at Thetford, Black Lake and Danville belongs to this series.

The rocks of this phase are believed to have been formed by differentiation from a single magma. Serpentine is metamorphic rock that has been derived by alteration from peridotite and in the hand specimen it is not easy to distinguish one from the other. They are both com-

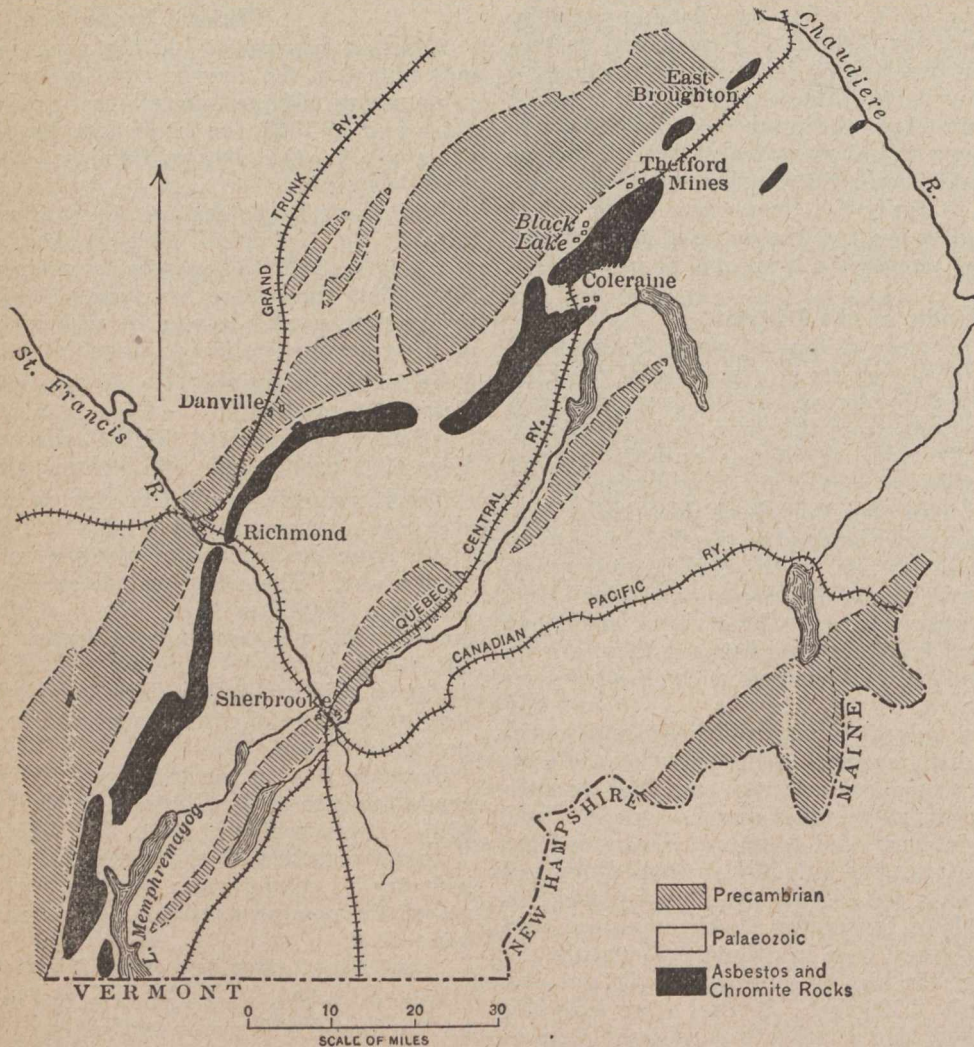


Fig. I.

In the serpentine belt two phases of igneous rocks may be distinguished which differ in the values they contain, in the state of preservation, and perhaps also in age. They will be referred to as the Thetford phase and the Broughton phase from townships in which they are well developed. Their general characters are shown by a comparative view of the rocks which compose them.

Thetford Phase:—Serpentine, Peridotite, Pyroxenite, Gabbro, Diabase, Porphyrite, Granite, Aplite.

Broughton Phase:—Serpentine, Soapstone, Greenstone schists.

Thetford Phase:—The Thetford series makes up the principal part of the serpentine belt. It includes the band of igneous rocks that extends southwesterly from Broughton Mountain near the northeastern boundary of

monly called serpentine. Pyroxenite is a fairly distinct rock, being often coarse grained. Gabbro, diabase and porphyrite are conveniently grouped under the name of diabase in the field, since they pass into one another by gradual transition and are not easily distinguished. Granite—in its fine grained acid phases aplite—is sometimes differentiated *in situ* from the other rocks, in others it has been intruded a little later showing the differentiation to have taken place previous to intrusion.

Broughton Phase.—The rocks of the Broughton phase form a narrow band that extends from range III of the Township of Broughton southwesterly as far as the Robertson mine in Thetford. Through several ranges in Broughton it is confined to lot 13, but crosses the township towards the northwest as far as lot 2 in range XI.

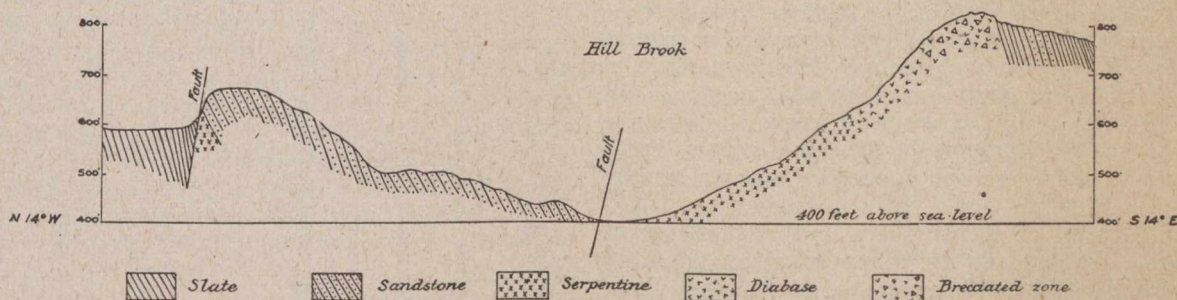
In Thetford it occurs principally in range V. Similar rocks also appear in ranges I, II and III of Tring, in or near lot 24, at the D'Israeli Asbestos Mine in Garthby range III, lot 16, and in other isolated areas in Leeds and Ham.

This phase contains the mines and prospects of East Broughton and those in the vicinity of Robertson.

The rocks have not yet been examined in detail, but they resemble the rocks of the Thetford phase in essential respects. The chief difference is in the state of preservation of the rocks, although there may have been also difference in their original composition. Probably they originally contained more pyroxenite. In the Broughton phase there is little, if any, peridotite accompanying the serpentine, which indicates that the alteration to serpentine is nearly complete.

sometimes extends to the top or outer edge of an intrusion, but the acid rocks whenever present are nearest the tops of sheets or the margins of other intrusions. Thus between the Danville Pinnacle and the St. Francis River, a distance of eight miles, the serpentine belt is in the form of a thick sheet dipping to the southeast at a high angle. Serpentine occurs along the northwest or foot-wall side, and diabase wherever present is on the southeast or upper side. The mines at Asbestos are in similar position with regard to the pyroxenite and diabase hills on the southeast and may be on the northeasterly extension of the sheet referred to above.

At the Robertson mine in the 16th lot of the range of Thetford, serpentine forms the lower or northwestern half of a sheet dipping southeast at an angle of 50 degrees, and schistose diabase the upper or southeastern portion.



DIAGRAMMATIC SECTION ACROSS THE SERPENTINE BELT

in range XIII, township of Cleveland, between lots 5 and 9

Scale . horizontal . 900 feet to $\frac{1}{2}$ inch.
 " vertical 300 " " "

Scale of Reduction :- 3 to 2

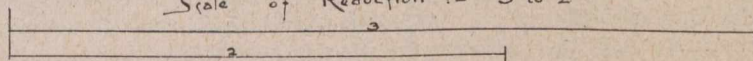


Fig. II

In the place of pyroxenite, which appears in the Thetford phase, there is its alteration product, soapstone, in the Broughton phase. The greenstone schists of Broughton probably had originally a composition similar to the diabase, or some closely related rock, in Thetford. Like the Thetford phase, they are doubtless differentiated from a single magma.

Granite has not been found in the Broughton phase, except in an isolated occurrence in range I, lot 24 of Tring, nor are any important bodies of chromite known in these rocks. These are the principal indications of different original composition in the two phases.

Structure of the Igneous Bodies.

The rocks of the Broughton phase and portions of the Thetford phase occur in bands, which follow the dip and strike of the enclosing sediments, and thus form sills or intrusive sheets. Other portions of the Thetford phase occupy elliptical areas sometimes narrowly connected with one another which are uncovered portions of a batholith or thick laccolith. The rocks are arranged in the following order: 1st, serpentine; 2nd, pyroxenite; 3rd, diabase,—in sheets, from the base upwards; in batholithic masses, from the centre outwards.

Where serpentine is in excess of the other rocks it

Several exposures in Broughton show soapstone in the upper, and serpentine in the lower parts of a sheet.

This arrangement of the rocks agrees with the relative basicity, and density of the principal minerals, and with the order in which they generally crystallize.

Order of Crystallization. Specific Gravity. Rocks Formed

1. Olivine	3.32	Peridotite (Serpentine)
2. Pyroxene	3.20	Pyroxenite (Soapstone)
3. Feldspar	2.70	With pyroxene forms, dia- base, etc.

Olivine crystallizing first would, in the lighter portion of the magma remaining fluid, settle towards the bottom of the sheet, even if at a high dip, and form peridotite, which later has been altered to serpentine. Closely following olivine, pyroxene crystallized and likewise settled, forming pyroxenite. By later alteration this has become soapstone.

Where pyroxene and olivine became mixed together, probably through crystallizing simultaneously, they formed by alteration the harder variety of serpentine in the Thetford phase, or the talcose serpentine of the Broughton phase.

Where pyroxene was mixed with feldspar, which crystallized next in general order, diabase and the related rocks were formed. This separation would be more nearly complete, the more slowly the cooling took place.

Granite has been formed in sheets in only two cases as far as known. On lot 24, range I of Tring, it occurs as a differentiate at the top of the sheet. In the other instance, in the Townships of Cleveland and Danville, it appears to have been injected later than the serpentine in which it occurs principally as dykes.

In the areas that are regarded as uncovered portions of a batholith, such as the hill between Thetford Mines and Black Lake, or between the west side of Black Lake and the Wolfestown road, the Belmina road, or the area about Little Lake St. Francis, serpentine occurs in the central part and is partially, or wholly, enclosed by pyroxenite, which in turn is generally bordered by a rim of diabase. The outer edge of the diabase usually contains fragments of the adjacent sediments and so passes into breccia. The accompanying cut (Fig. 3) shows the arrangement of the rocks as seen along a section from the Thetford River to Bisby Creek. The section follows the power line of the St. Francis Hydraulic Company from the property of the Dominion Asbestos Company southward.

A mile northwest of the northern end of this section the sediments dip towards the southeast at an angle of 70 degrees, and within a few yards of the contact, four miles northwest of the section, the dip is 75 degrees in the same direction.

The first igneous rock is diabase which in the outer portion sometimes contains fragments of sediment forming a breccia. The diabase may be seen near the Roman Catholic church in Black Lake. The section is then drift covered until the serpentine is reached near the lake road. Following the line of section, the serpentine continues across the hill above the Standard and Dominion mines, though with a considerable amount of pyroxene in the higher and southern part of the hill, and passes beneath a heavy covering of drift. Near the Quebec Central Railway, 560 yards north of Chrome siding, there is an exposure of pyroxenite and diabase at the south side of this serpentine area.

The drift covered area extends for two miles along the line of section until the second area of igneous rocks is met. This consists of breccia, diabase, pyroxenite, serpentine, pyroxenite, diabase and breccia in succession. The succeeding sediments stand vertically for half a mile south of the contact and at a distance of two miles dip towards the southeast at an angle of 75 degrees.

It will be noted that Thetford River and Bisby Creek occupy similar positions in erosion valleys, cut in the transition rock between the diabase and serpentine; that the general dip of the sediments on either side of the belt is southeasterly and that the dip, which is practically vertical near the contact on either side, is generally higher on the southeast than on the northwest.

No sediments have been found in the drift covered part of the section, but three miles west of the section, sedimentary slates strike towards this area nearly at right angles to the line of section. They dip away from each of the igneous ridges thus indicating a synclinal trough between them, which has been deeply filled with drift.

The structure of the serpentine belt as shown in this section, suggests a thick laccolith similar to that which contains the nickel deposits at Sudbury, but further investigation does not support the comparison very well. Parallel ridges such as occur here are not common, being found in only a few instances in the distance of nearly

100 miles thus far examined. Such cases seem to represent the dying out of one intrusive ridge and the beginning of another near and parallel to it.

The dip of the sedimentary rocks is in the same direction on either side of the belt and at high angles. The arrangement of the rocks in the two ridges is the same, while if they were parts of a laccolithic sheet they should appear in reversed order on the two ridges. It, therefore, seems probable that the igneous ridges are formed along two lines, perhaps minor anticlines, which have

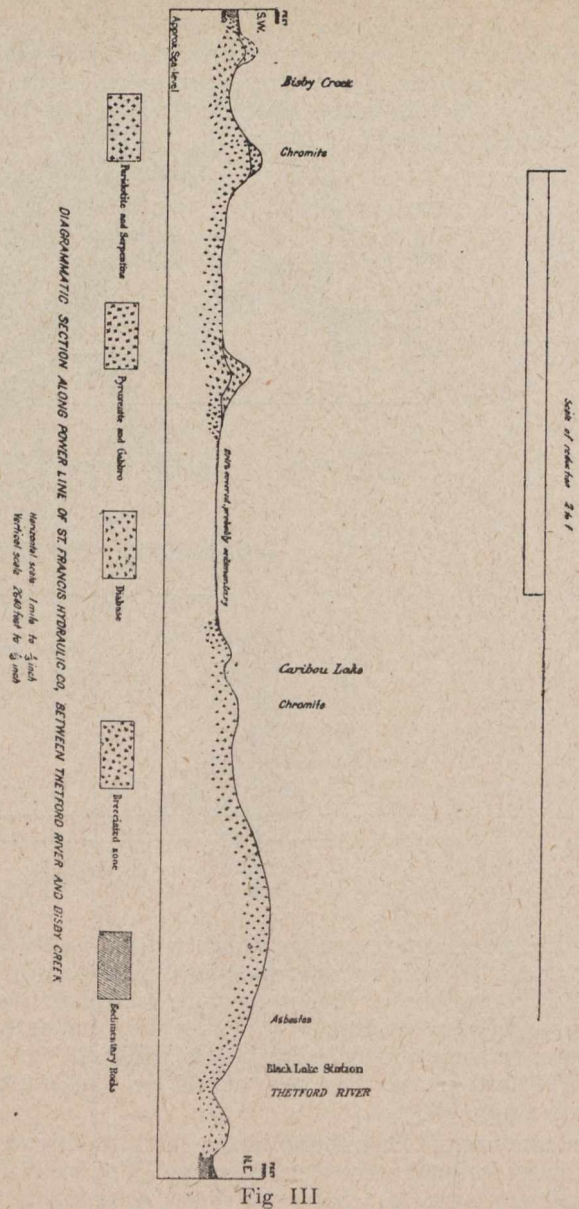


Fig III

afforded an easier ascent for the magma. They may be connected at no great depth beneath the sediments, yet they diverge sufficiently to permit of similar effects from differentiation taking place in each.

The arrangement of rocks by which the most basic rock is at the centre and the mass becomes more acid towards the outer edge is a common one in igneous intrusions of this class. It is theoretically accounted for by differentiation according to gravity taking place in a slowly-rising magma, thus bringing the more acid material, which formed the diabase and related rocks everywhere, in contact with the sediments. As the intrusion gradually rises, the acid margin is carried upward, forming an envelope over the advancing batholith. This is

seen in this district in such hills as Broughton, Adstock, and Big Ham Mountains which rise in cone, or saddle shapes, and are encased in diabase in the upper portions. Near the bases of these hills the diabase passes into gabbro, and where erosion has been especially heavy, pyroxenite and in places serpentine are exposed.

Location of Deposits.

THETFORD PHASE.

Character of the Rock.—The asbestos deposits of the Thetford phase of rocks are found only in the purest serpentine. This in a general way is indicated by softness of the rock, but serpentine impure from the presence of soapstone is also soft, but is not as valuable for asbestos. Therefore soft serpentine is favourable for asbestos only when there is no soapstone present.

As shown in the arrangement of the rocks above, the purest serpentine occurs in the lower parts of sheets and in the central portions of batholithic masses. As the trend of the serpentine belt is northeasterly, sheets in this district must dip either to the southeast or northwest. Where sheets dip to the southeast, as between Danville and Richmond, the best rock is found along the northwest side of the serpentine belt. In Garthby range II, where the dip is to the northwest, the best rock is near the southeast side of the intrusion.

In batholithic masses the purest serpentine, which would be found at the centre were the mass reduced to a horizontal plane surface, is best exposed around bases of the peridotite-serpentine hills, but especially near the north side. Thus the mines of Thetford are at the extreme northern edge of the serpentine hill which extends southwards to Caribou Lake, and the mines of Black Lake are situated along the northwest side of the same hill. The King mine in Ireland is on the northern edge of the hill of serpentine and peridotite which extends southward to the Lambly mine in Coleraine, while the Belmina and Chrysotile mines are on the northern and southern borders respectively of the hill which separates them.

Effects of Erosion.—The better exposure of asbestos-bearing serpentine on the north side is due apparently to glaciation, the ice having eroded the hills on the north side, against which the glacier moved, more deeply than on the south, or lee side. While equally good serpentine may, and probably does, extend around and through these central hills it is generally covered by harder and less productive rock except where erosion has been especially heavy.

Asbestos has been found on the south side of two of the larger hills, at Chrysotile, and at the old Lambey mine near Coleraine, but the northern side has thus far proven more productive.

Serpentinization.—Besides the purity of the original peridotite, and its exposure by erosion, alteration to serpentine is a necessary condition for the formation of asbestos. The precise nature and cause of this change, from peridotite to serpentine and, consequently, the parts of the rock mass in which it is most likely to take place, are as yet imperfectly known.

Peridotite is a rock consisting principally of the mineral olivine, which is composed of silica, magnesia and iron. In the change to serpentine, water is taken in to the amount of about 12 per cent., while iron and silica are probably in part removed. The serpentine thus produced is a softer rock than the original peridotite and shows few grains or crystal faces. Pure serpentine can thus be easily distinguished from fresh peridotite. But the greater part of the rock in the district is only partially altered to serpentine. Other conditions being equal, it appears to be more productive

the farther the alteration has gone. Consequently the degree of alteration must be taken into account, and this is a somewhat difficult feature to determine. Hardness is in part a guide, but examination by means of the microscope is often necessary to certainly determine the degree of alterations of the rock.

An important part, at least, of the change from peridotite to serpentine is due to the action of water. Whether this is due to meteoric waters such as now circulate through the rocks, or to magmatic waters which came in with intrusions of igneous rocks is a question for further investigation, as it bears on the importance of the granites as an indication of asbestos. But in any case the water reached the rocks, which it has altered, by means of fissures and fractures which are, consequently, an important indication of the part of the rock mass that is likely to be best serpentinized and to contain asbestos.

Fractures.—The parts of the rock mass which are altered to serpentine appear to depend in a considerable measure at least on the amount of fracturing of the rock, which is also a necessary condition for the forming of asbestos veins.

Where there has been much fracturing the rock is largely or wholly serpentine. Where other openings are not found the peridotite is commonly serpentinized along joint planes. In such cases veins of asbestos sometimes occur in a rock which, on the whole, is still a comparatively little altered peridotite. The hills on the south and west sides of Black Lake furnish a good example.

Serpentinization seems to proceed from any crevice into the wall rock on either side, and is generally followed by the formation of asbestos veins proportional in width to the band of serpentine. The asbestos veins in such cases are about one-third of the width of the serpentine band on either side of them.

The degree of serpentinization of the rock as a whole, and the amount of asbestos thus depends in a measure on the amount of fracturing. The fractures may be joints, or cleavage planes due to regional foliations, or the casting off of concentric shells from rectangular joint blocks probably induced by increase of bulk due to hydration.

Fracturing is thus both a cause and an effect of serpentinization. But in either case it is an indication of well serpentinized rock, provided the peridotite were originally pure.

Where the rock is too greatly fractured the veins of asbestos become so short as to be of little or no value. Thus when serpentine is in contact with sediments it is usually finely shattered and the asbestos, if any, is too short to be useful and occurs as slip fibre. The shattering of serpentine near the contact also suggests a primary gneissic structure, but a determination of the full cause of it requires further study.

Influence of Granite.—As a result of experience the presence of granite in an area of serpentine is generally regarded as a favourable indication of the occurrence of asbestos but the casual connection, if any, is not easily apparent. Granite is often contemporaneous with the diabase and in some cases also with serpentine. In such cases the granite is in irregular masses, and it is difficult to see what connection they could have on the occurrence of asbestos beyond indicating a very complete differentiation of the rock.

In other cases the granite has been intruded a little later than the other rocks and forms dykes and sills. The fracturing which was accompanied by the injection of these dykes would favour the development of

asbestos veins. Hence it is possible that they may be effects of the same cause, rather than that granite is any part of the cause of the occurrence as asbestos veins. It is possible and perhaps probable, as has been suggested by Dr. A. P. Low,* that the action of heated waters accompanying the injection of the granite dykes has aided in the serpentinization of the peridotite.

BROUGHTON PHASE.

The serpentine of the Broughton phase differs from that of the Thetford phase in being finely shattered and in containing asbestos principally in the form of "slip" or parallel fibre. It is also softer than the rock at Thetford and often has a talcose feel. Deposits of soapstone and sometimes of talc are found associated with it. It carries very little chromite even in disseminated grains and no deposits of important size. There is also no granite in the Broughton and related rocks, except in an isolated occurrence in the Township of Tring, which probably belongs to this series.

The whole series occurs in intrusive sheets with the serpentine at the base, soapstone and greenstone schist, when present, in ascending order to the top of the sheet. In some cases, however, serpentine makes up the whole or greater part of the sheet and so extends to both walls.

In the serpentine there are blocks and masses of a harder rock which have not yet been examined microscopically and which contain no asbestos. These occur more plentifully towards the base of the serpentine and often make up the greater part of the rock near the lower edge of the sheet. Accordingly the pits are usually situated a little above the extreme base of a sheet.

Summary.

The results of this investigation which seem to have a practical bearing on the location and estimation of asbestos, may be briefly summarized. Aside from the

evidence of asbestos actually seen, the conditions which it is important to observe as far as known are:

1. Purity of the serpentine.
2. Fracturing.
3. Presence of granite.

1. The purity of the serpentine is the most important feature. It depends on (a) the purity of the peridotite, or original rock. (b) Its degree of serpentinization.

(a) The purity of the original rock depends on the composition of the magma and its differentiation in cooling, the latter factor being largely influenced by gravity. The purest serpentine is accordingly found at the base of sills, or intrusive sheets, and in the central portions of batholithic masses.

The exposure of the central parts of batholithic masses in this district depends in a large measure on glacial erosion, which, in this district, has uncovered the most productive rock on the north side of the larger hills.

(b) The fractures are due to jointing, and regional compression; also probably to the increase of volume accompanying serpentinization and possibly to original flow structure around the margin of batholithic intrusions. Hence they are likely to be more abundant around the edges of serpentine and in zones of special regional foliation.

3. The granite, where intrusive, has accompanied a fracturing of the peridotite, a condition which is favourable to the formation of serpentine and asbestos. Magmatic waters accompanying the intrusions may also have aided in serpentinization. Granite dykes are, therefore, thought to be a favourable indication of the presence of asbestos veins.

*Report on the Chibougamau Mining Region, Geological Survey of Canada, 1906.

THE CLAY AND SHALE DEPOSITS OF NOVA SCOTIA AND PORTIONS OF NEW BRUNSWICK AND PRINCE EDWARD ISLAND.

BY HEINRICH RIES.

(From Summary Report of Geological Survey.)

The investigation of the shale and clay deposits in the above-named region occupied the summer of 1909. The writer was assisted in the work by Mr. Joseph Keele. The object of the study was to ascertain as far as possible what geological formations were clay and shale-bearing, and which of these deposits were adapted to the manufacture of clay products.

With this end in view, the clay and shale deposits were examined as thoroughly as was possible in the time at our disposal; and samples were collected for testing in the laboratory. The last was an important part of the work; since one can tell but little from the appearance of the material in the field.

The different brick plants in operation were also visited, and samples of their products taken for crushing, transverse, absorption, and freezing tests.

Nova Scotia.

The geological formations of Nova Scotia range from the Pre-Cambrian to the Triassic, and they are overlain nearly everywhere by a mantle of pleistocene material of variable thickness.

In certain formations the character of the material is such that there is little probability of its being of any

value to the clay-working industry, and these are considered first.

FORMATIONS OF NO PROBABLE VALUE TO THE CLAY-WORKER.

Pre-Cambrian.—This consists of crystalline rocks of either igneous or metamorphic character, which underlie a large portion of southwestern and southern Nova Scotia proper, and a large part of northern Cape Breton, as well as scattered areas in southeastern Cape Breton. None of the Pre-Cambrian rocks are of plastic character, nor do they become plastic when finely ground. They have no doubt been weathered to residual clays in the past; but these have probably been removed by glacial action. Only one deposit of residual material came to our attention, and this was a pocket on Coxheath Mountain, near Sydney, the clay there having evidently been formed by the decomposition of a light-coloured felsite, which occurs in some abundance in that region. The clay deposit is too small to be of any economic value. In recent years several attempts have been made to utilize this rock in the manufacture of firebrick, but up to the present time they have not been successful. Unfortunately some

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

The Montreal "Witness," July 11th, had a short editorial comment on fatalities in English coal mines. The "Witness" comments on the fact that in 1908 thirteen hundred persons lost their lives in mines, and refers to a recent debate in the British House of Commons concerning the Whitehaven disaster. The "Witness" remarks that "the one cheerful feature of the debate was the information that advance in life-saving has been made, and that in fifty years the fatal accidents have been reduced from five per thousand to less than one and one-half per thousand of the men employed. But the figures for 1908, as one member remarked, are still an indictment of the management of the pits." It should be remembered in considering these figures that in the fifty years referred to by the "Witness" the decrease in loss of life in coal mines has been accompanied by an increase in the tonnage of coal produced, which, for so small a country as Great Britain, is nothing less than remarkable. Reflections on the management of British coal mines will come more gracefully from Canadian newspapers when the accident rate in Canadian coal mines compares more favourably with the British fatality rate than is the case to-day. Although when the rate of mine fatalities in Canada is compared with that of the United States we have cause for congratulation, yet, unfortunately, we have fully as much cause for reflection when our figures are compared with those of Great Britain, France and Belgium.

The "Witness" refers to the Home Secretary's action in introducing a bill to the British Parliament for the organization and training of rescue corps. While we have no wish to depreciate the value of these appliances and the necessity for their adequate provision and the training of men in their use, yet it must be remembered that the proper way to reduce accidents is by preventing as much as possible the causes from which they arise. Your correspondent has on several previous occasions pointed out that the term "rescue apparatus" is a misnomer. The probabilities of being able to rescue any large number of men at coal mine explosions is always open to grave doubt. Up to the present time, and, we think, in the future, the proper use of breathing apparatus will be in checking the growth of incipient fires by enabling the underground fire brigade to approach within effective range of the fire, and in preventing such a fire from developing into a disastrous conflagration with dire results to both life and property. We have always argued that the provision of breathing apparatus, accompanied by the proper training of men in their use, is needful and should commend itself to every mine owner who has any regard for life or property; but their general use is not likely to be followed by any marked decrease in the fatalities incident to coal mining. The great majority of coal mine fatalities arise from falls of roof and side and from accidents connected with the mining machinery. On this source of fatalities the provision of breathing apparatus and the erection of rescue stations can, of course, have no effect whatever. If the Montreal "Witness" will compare the Canadian coal production of 10,500,000 tons per annum with the British coal production of 270,000,000 tons and put side by side with these figures the number of lives lost in the coal mines in each case, they will realize that if the British figures are to be considered as an indictment of the management of the pits a good deal could be said about the matter on this side of the water.

The Technical Education Commission.

The Federal Commission on Technical Education is expected to sit at Glace Bay about the beginning of August. From the remarks of the Chairman of the Commission at the opening sessions in Halifax the scope of this Commission's enquiry seems to be much wider than would be expected from the name that

has been given to it. All matters affecting the general environment of industrial workers will apparently be taken under review. Preparations are being made to have representative officials and workmen of the collieries give evidence before the Commission, and it is expected that the members of the Commission will visit the coal mines themselves and thus gather their information at first hand.

The Colliery Relief Societies.

The new scale of contributions and relief which resulted from the consolidation of the Colliery Relief Societies of the Dominion Coal Company, came into effect on the 1st of July, and deductions are now being made on the new basis. The relief payable to members is exceedingly liberal and should prove adequate to take care of all ordinary cases of sickness and accident. The members' monthly contribution is fifty cents, and the Coal Company will contribute equally with its employees. The weekly benefit for disability caused by sickness or accident is six dollars. In the case of death an immediate benefit of one hundred dollars is payable, and the widow will receive eight dollars per month for five years, with three dollars per month for each child until the age of fourteen years. Thus the widow of a member having four children would receive an income of twenty dollars per month for at least five years, in addition to the death claim of one hundred dollars. Provision is made for special grants to members suffering the loss of eyes or limbs. Each local branch will manage its own affairs, but all funds will be deposited in a central treasury. The general affairs of the Society will be administered by a Board of Directors on which the company and its employees will have equal representation. The assets and liabilities of the old societies have been taken over by a new society, and the Coal Company has deposited a sum equal to the accumulated surpluses of the former branches to the credit of the new society. It is expected that every employee of the company will eventually become a member of the Benefit Society, for which may safely be prophesied a long and useful life. In opening the proceedings of the first meeting of the general board of directors of the new society, Mr. Butler, the general manager of the Coal and Steel Companies, said that apparently the relations between the employees of the Coal Company and the management were entering upon a new and better era, and he forecasted for the new society that it would prove a strong factor in promoting harmonious relations between the management and their employees.

ONTARIO.

Cobalt.—A regular storm of protest is coming in from Gowganda and Porcupine, where the Government roads are being built, with the aid of prison labour. The labour unions have taken the matter up, and have petitioned the authorities to stop the practice. One of their strongest claims is that there are a great number of men in the district who are unable to obtain employment and that the action of the Government in using prisoners on the roads is taking away from these men the opportunity to make a living. The labour situation in the mining camps is quite satisfactory, although there is a considerable surplus of unemployed. During the past winter the possibilities of a strike for this summer were hinted at, but there has been no sign of it. The large element of foreign labour in the camp practically precludes a successful strike being made, and aside from that wages are so good, as a general thing, that there is very little cause for complaint.

The shipments from Cobalt for the first six months of 1910 show an increase of only two tons over the production for the corresponding period of last year. It is expected, however, that silver will show an increase of approximately two million ounces. This is due to the increased quantity of concentrates being

shipped, and the consequent falling off in the shipments of low grade ore. The Cobalt ore shipments for the six months totalled 14,915 tons, while the Gowganda output was 372 tons. The production of bullion in Cobalt for the same period amounted to 187,597 ounces.

Another new surface vein showing very high values in silver has been uncovered on the Lawson property. It was found near the Foster line and has already been traced for about 200 feet. It is irregular as to width, but where the stringers come together it shows up to twelve inches of rich ore.

The statement of the Crown Reserve for the first six months of the present year shows a profit of \$536,064. The returns from ore shipments amounted to \$709,569, while operating expenses and royalty charges totalled \$173,505. Dividends to the amount of \$530,644 were disbursed, leaving a balance of \$5,420. The value of the ore on hand is estimated at \$30,000.

Work has been started on the new concentrator for the Hudson Bay mine. It will have twenty stamps with an estimated capacity of sixty tons a day. An important concession has been made by the Government, by which the mining company is allowed a reduction of the royalty in the shape of a rebate for every ton of ore milled. The mine has formerly been paying a royalty of fifteen per cent. on the gross value of the output.

At the annual meeting of the Lang Caswell Company it was decided to end the pool and issue certificates to the shareholders. It was announced that a new vein four to six inches wide, and assaying about 150 ounces, had been uncovered. Only surface work is being carried on at the present time, but it is probable that underground operations will be resumed this fall. In the crosscut from the lowest level of the Little Nipissing, the No. 2 vein has been cut. The vein was wider than on the upper level and showed good values. It is probable that in the near future the winze will be sunk another seventy-five feet and a new level opened up.

Another new vein has been found on the Nipissing property near Peterson Lake. It is of good width and shows considerable silver. During the month of June this company produced 350,658 ounces of silver, valued at \$185,847, and shipped silver to the value of \$180,427. A new shaft has been started near the Chambers-Ferland line to develop a number of veins that have been found in that section.

The Kerr Lake has declared the regular quarterly dividend of five per cent. with a five per cent. bonus, payable September 15th. When this has been paid the shareholders will have received a total of 81 per cent. on a capital of \$3,000,000.

Professor Richards, of Boston, has been in camp for some time, and among other things has been paying particular attention to the different concentrators. He delivered a very interesting address before the local branch of the Canadian Mining Institute on "Recent Investigations into Ore Dressing." He stated that there was every probability of there being a fine set of mills in the near future. None of them, he believed, had gone far enough to arrive at any very definite conclusions, but they were proceeding in the right direction.

Underground work has been recommenced at the Columbus property. The company has been re-organized and is now under entirely different management.

Mr. Ludwig Rose, a representative of the German Government, has been in the district for some time past, studying different methods of mining and concentration. He is looking particularly into those properties where very high grade ore is produced.

The last few months since the introduction of power air and electricity, there has been a very considerable decrease in the gross earnings of the T. & N. O. Railway. This is largely due to the falling off in the consumption of coal, which now practically amounts to nothing. So far no figures are available relative to the saving of the new power over steam generated power. This is on account of the fact that air meters have not yet been installed, and that air is at present being sold on the basis of so

much per drill per shift. That the saving is great cannot, however, be doubted. Formerly power in the camp cost on an average \$150 per horse-power year. Now electric energy can be bought for \$50 per horse-power year, and the air, while sold on a different basis, probably does not cost much more.

A writ of execution has been issued against the Goulds Consolidated, one of the companies leasing their ground from Peterson Lake. A part of the surface equipment has been seized.

J. S. Bradley, who has been heading the fight against the Cobalt Central management, states that he now has sufficient powers of attorney sent him by the shareholders to overthrow the present control, as represented by Thomas Nevins and his associates. He has tried to do this several times before, but up to date has not succeeded.

At a depth of twenty feet below the main level of the Waldman, to the west of the shaft, ore has again been found in the vein. On the level the values had been cut out by a fault and it was on the other side of this that the ore was picked up. In this same section of the Gillies Limit, the Wyandoh shipped its first car of ore a short time ago. Part of it was high grade and part medium.

During the first six months of 1910 the McKinley-Darragh produced almost as much silver as in the whole of the preceding year, while the Savage produced as much as in the whole of its previous history. Three veins are now being worked on this latter property, which is in splendid condition with every indication of becoming an important shipper.

The first shipment from the new mill of the Nova Scotia, consisting of twenty-six bars of silver weighing 26,700 ounces and valued at \$14,685, was sent to England a few days ago. The Nova Scotia mill is a combination of pan amalgamation and cyaniding, and is a decided departure from the general run of mills in the district. The cyanide process is in use at the O'Brien, Nova Scotia and the Buffalo, the latter being the only one that has published data relative to the working costs. On this property only the slimes from the concentrating plant are treated. These averaged about 13 ounces silver and an extraction of only 66 per cent. was made. This seems very low, and it would appear that close slime concentration would work to as good advantage. Experts were called in some time ago, however, and several changes have been made in the process by which a much higher extraction is expected in the future.

A new ore shoot has been opened up on the 100 foot level of the Keeley mine in South Lorrain. Where cut the vein was about twelve inches wide of high grade ore. A big vein carrying about 200 ounces has also been found on the property of the Howard Syndicate near Ox Bow Lake.

It is stated that the Coniagas will resume its regular quarterly dividend of three per cent., which will be payable the first of August. Up to date this company has paid 29 per cent. on its capital of \$4,000,000. Developments on the third level are very satisfactory, the No. 2 vein giving wider and richer ore than it did on the level above.

Porcupine.—It is stated that Mr. A. E. Wallberg, who practically controls the Mines Power, Limited, of Cobalt, has purchased a lease of a water power, on the Mattagami River, in close proximity to the Porcupine camp. It is situated in the Temagami Forest Reserve, about nine miles from the boundary of Tisdale Township, and has an estimated capacity of 6,000 horse-power under a head of 120 feet. Survey parties have been sent in to make detailed plans of the water power and to lay out roads and transmission lines. It is doubtful if work will be started before next winter, because, although the district shows every sign of becoming of great importance, development has not proceeded sufficiently to absolutely prove it. The work accomplished during the next few months, however, will go a long way toward proving up the district. The installation of a plant of this sort would prove of immense benefit to the new camp. Situated as it is at a considerable distance from the railroad, and with no immediate possibility of a branch line being built,

wood will be the only fuel available for some time to come. The immediate supply of this, however, will soon become exhausted, as very extensive developments that will require a large amount of power have been projected by some of the properties. A small stampede has lately taken place into the country around Great Pike Lake, which lies about forty miles to the southwest of Porcupine. A number of samples showing high values in free gold have lately been brought out.

Another big vein has been discovered on the Timmins property. Not enough work has been done yet to define its extent, but where opened up it shows some spectacular values in free gold. On the 100-foot level of the main shaft some of the richest ore yet discovered on the property is being found. The vein is ten feet wide and values will run hundreds of dollars to the ton.

On account of the poor transportation facilities, provisions are very high, and all over the district men are being laid off until such time as the winter roads are in shape and supplies can be brought in at reasonable prices.

A rich discovery has been made on the property of the Standard Gold Mines Company in the Reserve. The vein is stated to be over twenty feet wide.

What the Government has refused to do, build a spur into Porcupine, will be undertaken by a private company if it can obtain the necessary permission. A number of business men made application a short time ago for permission to form a company and build a private line. The matter is now being taken up with the Government and definite word is expected very shortly.

A very important deal has just been put through whereby Mr. Lorne McGibbon, president of the La Rose, and Mr. Frank Armstrong have acquired the seventeen claims known as the Dobie properties. These were some of the first claims staked in the district, and some good finds are stated to have been made.

Gowganda.—As an evidence of the work being done in the Gowganda and Elk Lake sections it may be stated that altogether forty plants have been installed in those sections. Several of these have been shut down, but there is every possibility of others being installed next winter, and it is likely that some of those not working now will recommence before long. The Hitchcock claims at Elk Lake, which have been incorporated into the Royal Westmount Company, are making a very favourable showing.

The Millerett has shipped another carload of ore, bringing the total shipments since the first of the year to approximately 300 tons.

The deepest mining in the district is on the Reeves Dobie, where high grade ore has been found at a depth of 200 feet. During the coming winter this property will install two Nissen stamps, to reduce some of its low grade ores.

BRITISH COLUMBIA.

The occurrence of ore containing molybdenum at Aspen Grove is reported from Nicola district. The mineral was found there last summer, but not much development work has yet been done on the claim on which it occurs.

Drilling contests are not so frequent at annual celebrations in towns in the mining districts of the province as they were several years ago. At Nelson last month, on Dominion Day, J. Johnson and A. Erickson, of Silverton, Slovan Lake, won the double-drilling contest with a hole drilled in granite 37 3-4 inches in 15 minutes, using 8-lb. hammers and 7-8 inch drills. John Madson and Andrew Selba, of Rosslund, were second with a hole 37 1-8 inches deep. A. Erickson won the single drill event with a hole 16 1-2 inches in depth, Frank Johnson, of Salmo, coming second with 14 1-2 inches. Two Rosslund boys, Arthur Johnson, aged 13 years, and Fred Chenowith, aged 15 years, gave an exhibition of drilling, making a hole 15 inches deep in granite in eight minutes with 5-lb. hammers and 3-4 inch steel. At Republic, Washington, U.S.A., on July 4, Johnson and Erickson did

better than at Nelson three days earlier, for they drilled a hole 39 3-4 inches, as compared with that of 37 1-2 inches drilled by two Republic miners, who won the second prize. The first prize was \$200.

Recently a shipment of pig lead from ore smelted at the Consolidated Mining & Smelting Company of Canada's smeltery and refined in its electrolytic refinery at Trail, was made to Kiobe, Japan. This company supplies several lead works in Canada—two in Montreal, Que., and one in Vancouver, B.C.—with lead made from British Columbia ores, for corroding purposes and manufacture into pipe, sheet-lead, shot, etc., and the surplus over the quantity taken by the Canadian market is shipped to the Orient and Australia, chiefly to the former.

East Kootenay.

The Crow's Nest Pass Coal Company is completing, at its Coal Creek colliery, near Fernie, a boarding house for miners, which building, the Fernie "Free Press" states, will probably be one of the best appointed and most comfortable establishments of its kind erected in Canada. The building is three storeys high, a frame superstructure on a stone foundation. It is plastered throughout, steam heated, and lighted by electricity. In it there is accommodation for 50 men, allowing each man a comfortable bedroom, and, as well, there is accommodation for the family in charge.

Operations at the North Star mine, near Kimberley, Fort Steele mining division, yielded a net profit of \$11,759.84 for the fiscal year ended May 31, 1910, according to the report of the directors of the North Star Mining Company, lately made public. This report states that "about 3,000 tons of ore was shipped. Mining and exploration work carried on during the first part of the year was encouraging, and an interim report was issued to the shareholders in January, 1910, stating that the work was showing a measure of success, but nothing definite could be announced until further exploration work was done. The work was continued until the beginning of March, and conditions looked encouraging when, unfortunately, Mr. N. McL. Curran, manager at the mine, contracted lead-poisoning and was compelled to resign his position. At the same time scarcity of water and severe snow storms made it impossible to carry on work economically, so it was decided to close the mine temporarily, until weather conditions should improve and the services of a competent man could be obtained." A cash distribution of \$26,000, equal to two cents per share, was made to the shareholders on February 1, 1910. The late manager reported that the steam plant and tramway had been kept in running order and buildings in good condition.

Ainsworth Division.

Shipments of ore through Kaslo in June were not large, owing chiefly to a postponement of output of zinc ore from the Lucky Jim mine pending completion of an aerial tramway from the lowest adit down to the Kaslo & Slovan Railway. The Kootenian gives the following as the tonnage figures for the month:—Silver-lead: Rambler-Cariboo, 130 tons; Whitewater, 42 tons; Whitewater Deep, 25 tons; total, 197 tons. Zinc: Lucky Jim, 39 tons ore; Whitewater, 140 tons concentrate; Whitewater Deep, 350 tons concentrate; total, 529 tons. Total of silver-lead and zinc products shipped in June, 726 tons. For six months to June 30, the total output, including both silver-lead and zinc ore and concentrates, was 5,179 tons.

The Kootenay Silver Lead Mines, Limited, has been incorporated with an authorized capital of \$2,000,000, half of which is to be treasury stock, to acquire and operate the Highland silver-lead mine and concentrating mill, near the Town of Ainsworth, Kootenay Lake. Up to date there has been about 5,500 feet of development work done on the Highland group. The mine is equipped with an air compressor, machine drills, and all requisite accessories for practical mining and ore production. There is accommodation for about 60 men in the mine buildings. An automatic aerial tramway, rather more than a mile in length, connects the mine and mill. The mill requires eight men to run

it at full capacity of 200 tons of ore per 24 hours, but ordinary tonnage will be about 150 tons daily. Mill machinery is operated by water power. It is claimed that there is in sight sufficient ore to supply the mill for 300 days running three 8-hour shifts. A new adit, starting on the northeast side of the mountain, is being driven; it is in 175 feet and will reach the ore body within 100 feet additional distance. A car load of sorted ore from near the surface of the ore body this adit will cut at depth, returned 72.3 per cent. lead and 25 ounces silver per ton. It is planned to drive another adit from the opposite side of the mountain, after sufficient treasury stock has been sold to provide money for this development, to cut the ore shoots at about 300 feet below the old workings. This work will probably be commenced in August and it will take about five months to drive the 700 feet necessary to reach the ore. A published record of shipments over one period of eleven months shows a tonnage of 2,609 tons with an average of 69.5 per cent. lead and 23.3 ounces silver per ton; gross value, including lead bounty, \$111,523.

The West Kootenay Mining Corporation, Limited, lately registered in London, England, intends putting a 10-stamp mill on the Joker group, at the head of the south fork of Kaslo Creek.

Rossland and Trail.

The Rossland "Miner" has announced that it has been decided to close the Le Roi mine. It appears that diamond-drilling and other exploration work has failed to find other large shoots of ore of a grade that can be mined and smelted at a profit. There are still large bodies of ore in the mine, but these are of so low a grade as to make them unprofitable under existing conditions. The managing director, Mr. A. J. McMillan, has gone to England to consult his co-directors as to the future course to the company. Meanwhile work is to be entirely suspended.

The Consolidated Mining & Smelting Company's War Eagle mine, of the Centre Star group, which some time ago was not in nearly so promising a condition, now has ore bodies opened and being mined stated to warrant the claim that it is one of the best gold-copper mines in British Columbia. At no time for years has its condition been more satisfactory, according to the statements of those believed to be well informed, so that the expectation of excellent results seems to be based on good grounds.

At Trail on July 9 a valedictory banquet and presentation were given to Mr. Jules Labarthe, who lately resigned the position of superintendent of the Consolidated Mining & Smelting Company's smelting works and refinery at Trail, to take the management of the Mason Valley Mines Company, Yerington,

Lyon County, Nevada, U.S.A. The presentation was in the form of a handsome silver tray, made from silver smelted and refined at Trail. It bore this inscription: "Presented to Mr. and Mrs. Labarthe by the staff of the Trail smelter on the occasion of their departure from Trail, B.C., 1910." In the published report of the proceedings the following eulogy appeared: "Mr. Labarthe has been connected with the big plant at Trail since 1907, and it is largely due to his business acumen and thorough knowledge of the mining and smelting industry in the Kootenay that the plant has reached its present high standard of efficiency, it being one of the largest and best-managed concerns of its kind on the continent."

Similkameen.

The Hedley Gold Mining Company has ordered from the John McDougall Caledonian Iron Works Company, Limited, a 600 horse-power Doble impulse water-wheel, with special needle nozzle and auxiliary relief. This wheel is to be direct-connected to a 350 k.w. generator and is to supply power both for the company's mines and reduction works. The latter consist of the 40-stamp mill built several years ago by the Daly Reduction Company, with cyanide plant, etc. These were acquired last year by the Hedley Mining Company, which has since operated them in conjunction with the Nickel Plate group of mines. The quantity of ore put through the mill last year was about 31,000 tons, from which 16,200 ounces of gold was recovered. This year's tonnage is larger, and the company is paying its stockholders quarterly dividends at the rate of 12 per cent. per annum.

Coast District.

The business office of the Canadian Collieries (Dunsmuir) Limited is to be removed from Victoria to Vancouver. The executive office of the company, which lately acquired the property on Vancouver Island of the Wellington Colliery Company, Limited, will remain in Victoria.

A large occurrence of copper ore in a locality known as Green Lake, situated some 30 miles from the head of Howe Sound, in New Westminster mining division, is being developed. Construction of a railway inland from Howe Sound has been commenced, so that eventually transportation facilities will be available.

The Hidden Creek Copper Company's copper mine at Goose Bay, Observatory Inlet, the latter being an arm of Portland Canal, was recently examined by representatives of the Granby Consolidated Mining, Smelting & Power Company, Limited. There is a very large body of copper ore on the Hidden Creek Company's property, and should the mine not be sold, its present owners plan to erect smelting works near by for the reduction of this ore.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax.—As the result of the disturbance at the Cumberland Coal & Railway Company's colliery at Springhill, the troops have been called for, and several detachments will leave for the scene of the trouble to-day.

For some days past the miners who are on strike have become very restless, and several incipient riots have occurred. The men who are all members of the United Mine Workers of America have been on strike for more than a year, and the management at the mines has been steadily filling their places with men imported from outside points.

From four hundred to five hundred men are working. During the past few weeks the strikers have been ordered to vacate the houses owned by the company, so that they could be occupied by the men at work in the colliery. This was the cause of the recent outbreak. Several hundred of the strikers and their sympathizers have assembled on different occasions and hurled stones through the windows of the houses. The town police and the officers in

the employ of the company are unable to control the situation, and the management has asked for the military.

So far no person has received any serious injury, and the damage to the property is not great, but it is claimed that matters are gradually growing worse. On Saturday the representatives of the company made application to Judge Watterson, of New Glasgow, the County Court Judge for the district, for troops, and after the condition of affairs had been placed before him, a requisition for the military was sent to Colonel MacDougall, at Halifax.

The railway authorities at Halifax were communicated with, and arrangements were proceeded with at once for a special train.

QUEBEC.

St. Hyacinthe, July 23.—The news of the blowing in of a gas well of such a flow as to merit the term "gusher" in St. Barnabee County has aroused considerable excitement in the district. The existence of gas or oil has been suspected for many years, the first knowledge that such probably existed dating back for over

seventy years. At that time a farmer, while digging out stumps discovered water bubbling out of the earth and the news became common property in the neighbourhood. Lacking experience and capital, however, the finder allowed the matter to drop.

Some two years ago, Mr. Henri Grenon, hearing reports of the find, visited the Ontario oil fields and there became acquainted with Mr. Lauffer, an expert in oil well operations. Returning to St. Hyacinthe, Mr. Grenon succeeded in forming a small company with Mr. Samuel Girard as president, and Mr. Joseph Langevin secretary. They secured options on seven hundred acres of land and began drilling. Last week Mr. Lauffer, for the first time noticed a distinct odor of gas and immediately made preparations for capping the well when it blew in.

The flow of gas shortly began and is of such a volume as to justify the belief that a valuable gas field lies beneath the company's property. The present pressure at the valve is stated to be steadily in the neighbourhood of 125 pounds, with but very slight fluctuations in the flow. If the flow proves to be permanent there will be enough of the gas from this well to supply the town of St. Hyacinthe with both light and power.

ONTARIO.

Cobalt.—The Dominion Reduction Company has decided to erect a 100-ton custom concentrator on Kerr Lake, to treat the low grade ore from that section of the camp. It is understood that arrangements have been made to erect the plant on the property of the Crown Reserve, and that this company's ore will be the first to be treated. The Cobalt Central mill in that section also treats custom ores, but the location is against its being used to any great extent.

Cobalt.—A thirty-ton car of low-grade ore was despatched from the Little Nipissing, on Peterson Lake, this week, making the seventh shipment since last February. The ore will run in the neighbourhood of 500 to 550 ounces. Besides this car of low-grade, there is a twenty-ton car of high-grade that is being loaded now, and will be shipped this week. The high-grade will probably run over 3,500 ounces, and this is the hand sortings of the winze

ore. The management has the work in such shape now that a shipment is expected to be made every month. This will make the eighth car since February, when the mine made its initial appearance on the list of shippers.

Porcupine.—An event in the development of the Porcupine camp occurred recently, when the Timmins mill was started for the first time. This was an initial venture in the history of Porcupine and the whole town awaited the outcome with more than ordinary interest.

The results of the day's operations at the mill were promising.

Considerable satisfaction is expressed at the gratifying outcome of the work on the Timmins properties, and everyone is now convinced that Porcupine, as a gold camp, is here to stay.

It is announced that the Timmins interests have ordered a thirty-stamp mill, and that the same will be installed as soon as it can be got into the mining camp. Such a plant would handle about 200 tons of ore a day, and, with the excellent returns indicated from the day's run, would place the gold field in an enviable position as a large revenue producer.

BRITISH COLUMBIA.

Vancouver, B.C., July 23.—According to Mr. A. D. McRae, vice-president of the Canadian Collieries (Dunsmuir) plans are under way for a rapid development of the coal properties on Vancouver Island.

"Engineers under the direction of Mr. W. L. Coulson, manager of the mining department, are now laying out plans for increasing the production of our coal mines at Ladysmith and Comox. We expect to increase the production at least 50 per cent. before the end of this year and two years hence will be in a position to mine 10,000 tons of coal daily, or three times the amount now being extracted," said Mr. McRae.

"This, of course, will mean the employment of many hundreds of miners in addition to the present working forces. At present we can not supply the demand for coal and vessels are obliged to await their turn for coaling at the bunkers."

COMPANY NOTES.

AMALGAMATED ASBESTOS.

The annual report for the year ended May 31, 1910, of the Amalgamated Asbestos Corporation, Limited, has been mailed to the shareholders. It shows profits for the year of \$517,969.80, after all operating expenses have been met. From this is taken \$375,000 for bond interest, leaving \$142,969 available on the preferred stock. Only the initial quarterly dividend on the preferred stock has been paid, April 1, thus leaving a surplus of \$110,157.30 on the year's operations. The amount available for preferred dividends, if such were required to be paid in full during the first year, would be \$11,719 in excess of the amount required. The full year's dividend on preferred stock amounts to \$131,250, against an available sum of \$142,969 for the year just closed.

At first glance this appears distinctly disappointing, but we are informed that a great deal of necessary development work has been carried on out of earnings, and this naturally would be a severe drain on the revenue for dividend purposes. It is believed that this development work will place the company in an especially favourable operating position, enabling the management to cut down the ratio of operating expenses to gross to a figure very much below the present cost. Properly, however, the major portion of this heavy disbursement should have come from capital account, though if the preferred dividend can be maintained as in 1909-10, the holders of that stock will have little to complain of.

The general balance sheet shows that the company has cash of \$5,944 and accounts receivable, \$63,598. Asbestos on hand, valued

at contract sale prices, totals \$621,013. Accounts payable and pay rolls total \$121,428, and bills payable \$377,662, making current liabilities of \$499,090.

The president, Mr. E. B. Greenshields, in his official report, congratulates the shareholders on the satisfactory result of the year's operations, considering how the operations were hampered by development work. He also states that out of the \$110,157 surplus will be paid \$21,875, two months' interest on preferred stock, and \$21,300 for directors' fees, depreciation, etc., leaving \$66,982.30 to be carried forward. The company has contracts on hand amounting to \$3,637,000.

Mr. Greenshields states that the cost of all the improvements on the different properties will amount to about \$250,000 when finished.

Mr. Thomas McDougall, former general manager of the Quebec Bank, has been elected president of the Amalgamated Asbestos in place of Mr. E. B. Greenshields, retired.

The directors elected were: Hon. James M. Beck, Harry A. Berwind, Percy P. Cowans, George D. Crabbs, Theodore W. Cramp, E. B. Greenshields, Robert T. Hopper, H. Malcolm Hubbard, Hon. Robt. Mackay, Howard Ellery Mitchell, R. H. Martin, H. H. Melville, Thomas McDougall, John M. McIntyre and William McMaster.

Mr. P. P. Cowans and Mr. John M. McIntyre replace on the board Mr. Hugh A. Allan and Dr. R. V. Mattison, who have resigned.

Subsequent to the meeting of shareholders, the directors met and

elected the following officers: President, Thomas McDougall; first vice-president, Hon. Robert Mackay; second vice-president, Howard Ellery Mitchell; third vice-president, R. H. Martin; secretary and treasurer, R. P. Doucet.

Mr. Greenshields, in his remarks on the annual report, which was adopted, said:

"The year has been a satisfactory one for the company, especially so when it is remembered that during the first year most of the mines were taken over as separate going concerns, and had to be worked for a good while as practically separate properties, and that the improvements inaugurated had to be done during the producing season, and so interfered a good deal with the ordinary work of the mines.

"These betterments are now nearly completed, and the properties are already showing greatly increased production, the Kings Mines having had a record month in June. This great mine is the company's most valuable asset, and the shareholders should be gratified in knowing that, considering the quality and quantity of its product, and also the great extent of its territory, it is the finest asbestos property in America."

CROWN RESERVE.

The Crown Reserve half-yearly statement to June 30 shows:

We shipped during that period 51 cars of ore, 13 cars being high grade and 38 being low grade, of a total net value of	\$709,569.53
Bank interest	2,500.00
Ore on hand	30,000.00
	<hr/>
	\$742,069.53
Our operating expenses for the same period, including a large amount of development work, were	109,644.18
	<hr/>
	\$632,425.35
Less royalty to the Ontario Government for the same period	63,861.26
	<hr/>
Showing a net profit on our operations for the three months of	\$568,564.09
Out of this amount dividends have been paid as follows:	
No. 8 paid 15th April, 1910	\$265,322.10
No. 9, payable 15th July, 1910	265,322.10
	<hr/>
	530,644.20
Leaving a balance which will further strengthen our substantial surplus of	37,919.89

Surplus December 31st, 1909	\$549,275.42
Surplus as above	37,919.89

Surplus at 30th June, 1910

\$587,195.31

LAKE SUPERIOR.

The Lake Superior Corporation's fiscal year ended June 30 last. The annual report of the company is now in preparation, and a favourable showing is looked for. For the past year the corporation has been improving and expanding its plants, and constructing new works for the diversification of its products. Most of this new construction work is now nearing completion, and the earning power from now on will be practically doubled. The Lake Superior Corporation has sufficient business on its books to keep its plant fairly well employed to the latter part of November. One of its largest consumers is the Canadian Pacific Railway Company, which gives the corporation practically all of its steel requirements. For the past few years the Canadian Pacific has placed on an average of close to 90,000 tons of steel rail orders a year with the Corporation. The growing demand for structural steel has brought the attention of the Lake Superior Corporation's management to the necessity of constructing a structural steel mill, with the result that a mill will be built in the near future. The Dominion Steel Company is now receiving the bulk of the structural steel business, but when the new mill of the Lake Superior is completed, the management expects to get its share of the structural orders placed.

ACADIA COAL COMPANY.

New directors for Acadia Coal have been elected as follows:—Sir Montagu Allan, president; Emile Franconi, of Brussels, vice-president; H. S. Holt, second vice-president; Mr. Beaudry Leman, secretary-treasurer.

The other directors are: Mr. Charles S. Hosmer, Hon. R. Dandurand, Martial Chevalier, Andrew A. Allan, Hubert Biemans, Colin Campbell, Lambert Jadot, of Brussels, and Bryce J. Allan. Mr. C. J. Coll remains general manager.

As announced some time ago, Belgian capital has been interested in the property, and about a million will be spent improving the property.

CONIAGAS MINE DIVIDEND.

The regular dividend of three per cent. quarterly on the stock of the Coniagas Mines, Limited, will be paid on the 1st of August, in accordance with the resolution passed at the last meeting of directors.

STATISTICS AND RETURNS

VAN ROI.

Cable:—"Mill report for the month of June:—Total amount crushed 3,013 tons, yielding 120 tons of lead concentrates, assaying 142.4 ounces silver, 54.8 per cent. lead, 14.8 per cent. zinc; and 170 tons zinc concentrates, assaying 38.0 ounces silver, 1.3 per cent. lead and 45.3 per cent. zinc. Total approximate value, \$12,303 (£2,537). Mill ran 536 hours. Estimated expenditure for corresponding period on development, ore production and milling, \$13,430 (£2,769). South reef, No. 4 level—Along the hanging wall eastwards advanced 49 feet, low grade; westwards, 128 feet. Average width is 4¼ feet; average value is 18 ounces silver, 7¼ per cent. lead, 12 per cent. zinc. No. 3 level towards south reef advanced 63 feet."

SILVER MARKET.

Samuel Montagu & Company write under date July 14: The stringency in delivery to which we referred last week, became intensified; so much so that it could be described only as a corner into which the market had been engineered by the Indian specu-

lative group. Anxiety to profit by the high prices paid by the government brought about an actual shortage on this side; but the storage of one or two millions of actual silver deliberately withheld from the market, stamps the present situation as artificial.

The effect of the squeeze on the price of spot silver was to raise the quotation to 25½ on the 9th and 11th inst. This is the highest price for over two years, namely, since March 20th, 1908.

The corner had been rendered practicable by bear sales of forward silver having been made some two months back to the extent of about a million sterling. These sales were not speculative in the ordinary sense of the word, but were made in the course of business as a hedge against exchange, and similar sales have been on many previous occasions bought in or carried forward when due, without appreciable disturbance of values. But, in this case, these forward offerings had been bought up, plus all surplus silver ready for delivery, the actual silver was locked up, and the sellers when their sales matured, found that

they had been caught napping and had to pay anything from two to four per cent. for the purpose of meeting their obligations.

To bring about this stringency large speculative risks have been taken, and are still borne by the group responsible for the corner, who have not unloaded any of their huge holdings. To cope successfully with the situation thus created, a favourable market must be awaited, and, if that be practicable, there remains the delicate operation of feeding the demand rapidly without provoking a fall in prices.

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending July 23rd, and those from January 1st to date:

	July 23.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Beaver .....	.....	180,617
Buffalo	50,010	1,183,678
City of Cobalt .....	.....	422,735
Chambers Ferland	59,400	960,600
Cobalt Central .....	.....	293,286
Cobalt Lake .....	.....	260,900
Cobalt Townsite .....	.....	116,860
Colonial .....	.....	148,900
Coniagas	60,400	926,056
Crown Reserve	203,900	3,794,558
Drummond .....	.....	664,200
Hargraves .....	.....	221,170
Hudson Bay .....	.....	297,835
Kerr Lake	300,142	5,879,958
King Edward .....	.....	221,296
La Rose	227,400	6,925,941
McKinley-Darragh	95,240	1,870,689
Nipissing	484,600	6,478,867
O'Brien .....	.....	758,086
Peterson Lake	101,710	432,420
Provincial .....	.....	65,000
Right of Way	75,900	957,647
Silver Cliff .....	.....	159,990
Timiskaming .....	.....	1,002,570
Trethewey	49,260	641,110
Waldman .....	.....	63,992
Wyandoh .....	.....	48,300

Ore shipments for the week ending July 23rd were 1,716,962 pounds, or 858 tons.

Total shipments from January 1st to July 23rd were 34,977,261 pounds, or 17,488 tons.

Shipments of ore from Cobalt camp for the week ending July 16th consisted of 1,095,300 lbs., or 548 tons, divided among nine mines. Kerr Lake and Nipissing were the big shippers. Rather infrequent shippers represented were the Townsite and Hargraves mines. Since the first of the year the camp has shipped 33,260,299 lbs., or 16,630 tons. Shipments for week and year in lbs. of ore are:

	July 16.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Beaver .....	.....	180,617
Buffalo	54,000	1,124,668
City of Cobalt .....	.....	422,735
Chambers Ferland	64,000	901,200
Cobalt Central .....	.....	293,286
Cobalt Lake .....	.....	260,900
Cobalt Townsite	48,860	116,860
Colonial .....	.....	148,900
Coniagas .....	.....	865,656
Crown Reserve	64,000	3,590,658
Drummond .....	.....	664,200
Hargrave	41,370	221,170

Hudson Bay .....	.....	297,835
Kerr Lake	300,000	5,579,816
King Edward .....	.....	221,296
La Rose	152,000	6,698,541
McKinley-Darragh	95,980	1,775,449
Nipissing	293,000	5,994,267
O'Brien .....	.....	758,086
Peterson Lake .....	.....	330,710
Provincial .....	.....	65,000
Right of Way .....	.....	881,747
Silver Cliff .....	.....	159,990
Timiskaming .....	.....	1,002,570
Trethewey .....	.....	591,850
Waldman .....	.....	63,992
Wyandoh .....	.....	48,300

QUEENSLAND GOLD RETURNS.

The gold returns of Queensland for June were as follows:

	Tons crushed.	Yield in ozs.
Charters Towers	17,600	(12,900
Croydon	400	(*400
Gympie	13,400	300
Mount Morgan	10,800	5,700
Ravenswood	1,600	(4,200
Other fields	6,900	(*9,900
Alluvial .....	.....	1,900
		(1,900
		(*1,100
		300

Total yield in ozs. 41,600

The following calls were made and dividends paid:

Charters Towers	£4,800	£15,000
Croydon	600	nil
Gympie	3,700	7,200
Mount Morgan	nil	50,000

—Reuter.

* From copper ore.

NEW SOUTH WALES OUTPUT.

Sydney, July 7.—The gold yield of New South Wales for June amounted to 12,147 ozs., valued at £43,588. The yield for the six months ended 30th June was 100,129 ozs., valued at £360,638.—Reuter.

BRITISH COLUMBIA ORE SHIPMENTS.

The Convention and Lucerne mines made what were probably trial shipments, to the Consolidated Company's smelter at Trail, this week. The following are returns of the ore production and movement for week ending July 16th:

Rossland Shipments.

Centre Star	4,049	107,576
Le Roi No. 2	587	18,027
Le Roi No. 2, milled	300	8,400
Le Roi	490	8,458
I. X. L.	8	139
Other mines .....	.....	258

Boundary Shipments.

	Week	Year.
Granby	20,071	671,503
Mother Lode	6,500	174,705
Snowshoe	2,014	92,379
Oro Denoro	304	7,038
Jack Pot	275	2,971
Other mines .....	.....	587
Total	29,164	949,183

Total	5,434	142,858
Slocan-Kootenay Shipments.		
St. Eugene, milled	2,775	77,700
Van Roi, milled	800	22,400
Whitewater, milled	250	5,750
Queen, milled	420	11,760
Granite-Poorman, milled	250	7,000
Nugget, milled	110	3,080
Richmond-Eureka	60	2,464
Standard	39	702
Emerald	5	1,097
Sullivan	498	6,972
Queen Victoria	290	1,809
Convention	5	5
Lucerne	3	3
Other mines		35,607
Total	5,505	170,443

The total shipments, including the estimated milling, were for the week, 40,103 tons, and for the year to date, \$1,262,484 tons.

B. C. Copper Company's Receipts.

Cranbrook, B.C.		
Mother Lode	6,500	174,705
Oro Denoro	304	7,038
Jack Pot	275	2,971
Total	7,079	184,714

Granby Smelter Receipts.

Grand Forks, B.C.		
Granby	20,071	671,503
Other mines		120
Total	20,071	671,623

Consolidated Company's Receipts.

Trail, B.C.		
St. Eugene, concentrates	138	9,315
Van Roi, concentrates	90	758
Le Roi No. 2, part concentrates	587	18,027
Centre Star	4,049	107,576
Le Roi	490	8,458
Snowshoe	2,014	92,379
Richmond-Eureka	60	2,464
Standard	39	702
Emerald	5	1,097
First Thought (U. S.)	158	2,584
Sullivan	498	6,972
I. X. L.	8	139
Queen Victoria	290	1,809
Convention	5	5
Lucerne	3	3
Other mines		15,177
Total	8,434	267,465

The total receipts at the smelters, including concentrates, were, for the week, 35,584 tons, and for the year to date, 1,123,802 tons.

Le Roi No. 2—Cable: "Josie mine report for June—Shipped 2,702 tons. The receipts from smelter are \$82,759 (£17,064), being payment for 3,498 tons shipped, and \$3,511 (£724), being payment for 183 tons concentrates shipped. In all, \$86,270 (£17,788)."

DOMINION COAL FOR JUNE.

Dominion Coal output for June was 359,121 tons.	
Shipments, June 1910	337,145
Shipments, June 1909	393,541

Decrease, June, 1910	56,396
Shipments, 6 months, 1910	1,296,125
Shipments, 6 months, 1909	1,245,883
Increase, 6 months, 1910	50,242

SCOTIA'S COAL SHIPMENTS.

Nova Scotia Steel and Coal Company reports as follows for June:—

Shipments, June, 1910	87,938
Shipments, June, 1909	95,950
Decrease, June, 1910	8,012
Shipments, 6 months, 1910	330,502
Shipments, 6 months, 1909	274,506
Increase, 6 months, 1910	55,996

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, July 9.—Interest in Sheep Creek camp continues to increase and many visitors have been on the ground during the past week, but no new deals or strikes of importance have been received at the close of the week, other than those already reported. Ore shipments are well up to the average for the year.

Appended are shipments and smelter receipts in detail:—

Property	Week	Year
Boundary.		
Granby	21,316	651,432
Mother Lode	10,500	168,205
Oro	29	6,734
Jack Pot	1,005	2,696
Snowshoe	2,250	90,355
Nickle Plate (Hedley)	60	442
Other mines		163
Total	35,160	920,019
Rossland.		
Rossland	4,169	.....
Le Roi No. 2 (Centre Star)...	630	17,392
Le Roi No. 2 (milled).....	300	8,100
Le Roi	164	7,968
Great Western	9	9
May Flower	13	38
Other mines		399
Total	5,285	137,433
Slocan-Kootenay.		
St. Eugene (milled)	2,775	74,925
Whitewater (milled)	600	16,200
Van Roi (milled)	800	21,600
Granite Poorman (milled)	250	6,750
Queen (milled)	420	11,340
Nugget (milled)	110	2,970
Yankee Girl	126	2,965
St. Eugene	357	9,177
Whitewater	40	735
Queen Victoria	340	7,519
Sullivan	257	6,474
Second Relief	30	94
East Mount	69	450
Ferguson	71	612
Standard	37	663
Eureka	85	2,404
Mine Queen	37	344
Other mines	37	24,515

Total shipments for the week, 46,849 tons, and for year to date, 21,41,179 tons.

Smelter Receipts.

Granby, Grand Forks	21,316	651,552
Consolidated Co., Trail	8,833	259,095
B. C. Copper Co., Greenwood..	11,534	177,635
Total tons	41,683	1,088,282

COMPANY NOTES

KERR LAKE DIVIDEND.

The directors of the Kerr Lake have declared the usual quarterly dividend of 25 cents, and the usual extra dividend of 25

SHARE MARKET.

(Courtesy of Warren Gzowski & Co.)

Miscellaneous.—July 25th, 1910.

	Bid.	Ask.
Amalgamated Asbestos .....	..	16½
Dominion Coal Company .....	..	..
Dominion Steel Company .....	..	..
Nova Scotia Steel .....	..	81
Granby	30	34
Consolidated Smelting	60	70
Crow's Nest Pass .....	..	88
Dominion Coal & Steel Corporation....	51	51½

Cobalt Stocks.—July 25th, 1910.

Amalgamated .....	.03	.037½
Beaver Consolidated .....	.20	.20½
Buffalo	1.75	2.25
Chambers Ferland .....	.19	.19¼
City of Cobalt .....	.23½	.23¾
Cobalt Central .....	.08¼	.11
Cobalt Lake .....	.15¾	.16¼
Coniagas	4.10	5.15
Crown Reserve	2.60	2.64
Gifford .....	.03¾	.04½
Foster .....	.09	.12
Green Meehan .....	.01	.02
Great Northern .....	.07	.07½
Hudson Bay	80.00	89.00
Hargraves .....	.17½	.17¾
Kerr Lake	7.00	7.55
La Rose	3.50	3.77
Little Nipissing .....	.147½	.15¼
McKinley Darragh Savage .....	.94	.96½
Nancy Helen .....	.02½	.04¼
Nipissing	10.35	10.45
Nova Scotia .....	.32½	.33
Otisse .....	.037½	.04
Peterson Lake .....	.17¼	.177½
Right of Way .....	.19	.23
Rochester .....	.14¾	.15
Silver Leaf .....	.06½	.067½
Silver Bar .....	.05	sellers
Silver Queen .....	.11	sellers
Timiskaming .....	.59	.59¾
Trethewey	1.20¼	1.20¾
Watts .....	.04	.10
Ophir .....	.21½	.35
Wettlaufer .....	.62	.75

New York Curb.—July 25th, 1910.

Boston Copper	15	20
British Columbia Copper	47½	477½
Butte Coalition	16¾	17¼
Canadian Mines	6	6¼
Chino Copper	11¼	117½
Davis-Daly Copper	157½	17
Ely Consolidated .....	.19	.22
Gila Copper	5	6
Giroux Mining	67½	61½

Goldfield Consolidated	8¼	85
Green-Canadian	6¾	7
Harcuvar Copper .....	..	..
Inspiration Copper	67½	7
Miami Copper	187½	187½
New Baltic Copper	5	8
Nevada Con. Copper	18¼	18½
Ohio Copper	177½	177½
Rawhide Coalition .....	.13	.14
Ray Central	2¼	25
Ray Consolidated	16½	17
Union Mines	177½	177½
Yukon Gold	3 15/16	4

TORONTO MARKETS.

July 25.—(Quotations from Canada Metal Co., Toronto).

Spelter, 5½ cents per lb.
 Lead, 3.65 cents per lb.
 Antimony, 8 to 8½ cents per lb.
 Tin, 35 cents per lb.
 Copper, casting, 13.10 cents per lb.
 Electrolytic, 13.10 cents per lb.
 Ingot brass, 9 to 12½ cents per lb.

July 25.—Pig Iron (Quotations from Drummond, McCall Co., Toronto.)

Summerlee No. 1, \$23.50 to \$24.00 (f.o.b. Toronto).
 Summerlee No. 2, \$23.00 (f.o.b. Toronto).
 Midland No. 1, off the market.
 Hamilton No. 1, \$20.50 (f.o.b. Hamilton).
 Hamilton No. 2, \$20.00 (f.o.b. Hamilton).
 Clark's, \$20.25 (f.o.b. Toronto).
 Cleveland, \$20.50 (f.o.b. Toronto).
 Coal, anthracite, \$5.50 to \$6.75.
 Coal, bituminous, \$3.50 to \$4.50 for 1¼-inch lump.

Coke.

July 22.—Connellsville Coke (f.o.b. ovens).
 Furnace coke, prompt, \$1.65 to \$1.70 per ton.
 Foundry coke, prompt, \$2.10 to \$2.25 per ton.

July 22.—Tin (Straits), 33.37½ cents.
 Copper, Prime Lake, 12.60 to 12.70 cents.
 Electrolytic copper, 12.37½ to 12.50 cents.
 Copper wire, 14.00 cents.
 Lead, 4.50 cents.
 Spelter, 5.35 cents.
 Sheet zinc, (f.o.b. smelter), 7.50 cents.
 Antimony, Cookson's, 8.20 cents.
 Aluminium, 22.50 to 23.25 cents.
 Nickel, 40.00 to 47.00 cents.
 Platinum, ordinary, \$34.00 per ounce.
 Platinum, hard, \$36.00 per ounce.
 Bismuth, \$2.00 per lb.
 Quicksilver, \$47.00 per 75-lb. flask.

SILVER PRICES.

		New York.	London
		cents.	pence.
July	7.....	54½	257½
"	8.....	547½	257½
"	9.....	547½	257½
"	11.....	55¼	257½
"	12.....	557½	25¼
"	13.....	54	25
"	14.....	54¼	257½
"	15.....	54½	25¼
"	16.....	54½	257½
"	18.....	547½	25¼
"	19.....	54¾	257½
"	20.....	547½	25¼
"	21.....	547½	....
"	22.....	54½	257½