

The coal trade of Cumberland County, during the summer months is confined to the Springhill and Joggins collieries. The demand has been about as usual, for these months when there is little coal burning weather. The barges built by the Springhill Company a couple of year ago, have been kept busy between Parrsboro and Bay of Fundy and New England ports. Transportation has been cheapened and the owners of barges have benefited in consequence or been enabled to push their sales into new territory in the face of keen competition.

St. John is the principal market for Cumberland coal. Competition, there, has been keener than ever owing to the determined effort made by the Dominion Coal Co. to obtain a foothold for Cape Breton coal in that market. Prices have been falling ever since the beginning of the season, and the war is still carried on with great vigor. Meanwhile St. John manufacturers, and others are enjoying the fun, and endeavoring to make long term contracts to provide against a possible agreement among the coal companies.

At Springhill very little new work is being carried on, with the exception of the rebuilding of No. 3 slope pithead buildings, destroyed by fire in February. Thus far only the trestle work in the immediate vicinity of the slope has been erected, and it is reported that the Company has abandoned the trestle connecting the two slopes. The engines at No. 3 slope which were badly damaged by the fire, have been thoroughly overhauled and repaired by Roob, of Amherst. A substantial foundation has also been put in, so that this slope should be in readiness for work within a couple of months if required. Nothing has yet been done towards rebuilding at No. 2 slope. Meanwhile only No. 1 slope is operated. The output is about 1600 to 1700 tons for a shift and a half. The pit works all day, and a half shift at night, which gives the men three-quarter time steadily. The outlook for the winter, with the return of better coal-burning weather and a stronger demand for domestic coal, is considered fairly good.

Mr. Henry McArthur has filled the position of Acting Manager since the resignation of Mr. Archibald in May.

The River Hebert Mine, the property of the Seaman estate, worked under lease by Mr. Wm. Hall, has resumed operations on a large scale. Mr. Hall has a contract for five thousand tons for the I. C. R. During the summer the slope was sunk 300 ft., level driven a considerable distance east and west, opening up a new part of the area where the coal is of better quality. The capacity of the mine has thus been increased to about fifty tons a day.

The smaller mines about Maccan and Chignecto, which have been idle since April, are again showing signs of life and activity. Their sales are confined to the immediate neighborhood of the pits. One of the pits formerly worked by Messrs. Wetherby and Ripley, is said to be lost through careless mining, followed by spontaneous combustion. Mr. James Baird, who understands the nature of that coal-field, and is a sound practical operator, has had greater success. The Smith pit at Maccan station is doing little or no work, and the coal seam continues unsatisfactory. Occasionally this mine is visited by some Americans who appear to have a scheme of some kind concealed about their person, which fails to materialize. Mr. Frank Burrows has charge of the property.

The examination for granting managers certificates, came off on the 25th, 26th and 27th, of this month, at Springhill.

Gold Mining in Nova Scotia.

By F. H. MASON, Halifax.*

Twenty-five years ago Prof. Henry Youle Hind read a paper before the Society of Arts on "Gold Mining in Nova Scotia," and the writer proposes to draw some comparisons between the costs and methods of mining then and at the present day. The writer cannot give a better description of the lodes than Prof. Hind, who has made a life-long study of them, who wrote as follows:—

The lodes of Nova Scotia may be grouped as follows:

I. Bedded Lodes—Consisting of beds of quartz interstratified with slates and quartzites of contemporaneous age with them, these are the most abundant, and from them a considerable proportion of the gold is obtained.

II. Intercalated Lodes—These almost always, as far as known, occur in slates, and are numerous in broad bands of slate from 10 to 70 feet in width. Where these lodes abound it would be profitable to crush both the slate and the quartz, for gold is not infrequently found in the slate. The best illustrations of the intercalated lodes occur in Sherbrook and Wine Harbour.

III. Gash Lodes, occurring where the strata has been locally squeezed out of place. Instances are known in various districts, the most important being at Renfrew.

IV. True Lodes or Veins, cutting the strata. Some of these are very rich, but those which have been worked proved very narrow. The irregularity of true lodes is well known, and the fact that hitherto this class has yielded comparatively inconsiderable results should not discourage operations, for true lodes frequently thin out to a mere film of quartz and increase to a thickness of several feet within a vertical distance of a few fathoms.

These lodes occur in the lower silurian formations.

Prof. Hind describes the Sherbrook gold district as follows:—

If a slightly undulating line be drawn on the course of S. 83 degs. W. (true) or N. 75 degs. W. magnetic north, from area 775, on the east side of the St. Mary's river, it will represent part of the axis of the Sherbrook anticlinal. On the north side of the axis the lode dips to the north at an angle of about 45 degs., except on approaching the axis, when they commence to curve. On the south side the dip varies from 80 degs. to vertical, except when making the curve. Proceeding south from the axis, the lodes become more persistently vertical, until they acquire a slight northerly dip, thus showing that the form of the anticlinal is that of a slight overturn to the south, as represented in the sections. On making the curve some of the lodes sweep gradually round, with a dip varying from 80 degs. south to 60 degs. south-west, 35 degs. south-west by west 26 degs. W., then gradually increasing until they acquire the normal dip on the north side of the anticlinal of 45 degs. north. The strata and contemporaneous lodes at Sherbrook may be described as beds of slate and quartzite with thin sheets of auriferous quartz folded in an overturn anticlinal form, and subsequently tilted to

the east by a cross anticlinal. The denuded crest of the intersections of the anticlinals has exposed the sheets of quartz in the form of long semi-ellipses, whose bases rest upon Cambrian gneiss, from which the silurian quartzites and slates have been removed by denudation. Numerous dislocations, having generally a north and south course occur in Sherbrook. These appear to have taken place during the north and south folding. Some of them are represented in the plans and in the sections.

Having given a description of a typical gold district, and one from which over 2,000,000 dollars worth of gold has been extracted, the writer will now turn to the methods of mining.

During the 25 years which has elapsed since Prof. Hind read his paper, the mining of gold in Nova Scotia has not progressed by the leaps and bounds which he had hoped to see. The principal improvements have been in the stamp-battery, the fast drop (90 to 100 per minute), taking the place of the slow drop of about 40 per minute, heavier stamps have been introduced and the construction of the mortar improved. Silver-plated copper plates are taking the place of copper plates, and the length of them considerably increased, and mercury traps have been generally introduced. Some few mines have put in concentrating machinery, but in the majority of cases the concentrates are allowed to flow away with the tailings, and enormous quantities of gold are being lost yearly through this neglect. This neglect is the more astonishing because in the majority of cases, the owners and managers know the value of the tailings which are being lost. The writer has in several instances made assays of concentrates which have run over 10 ozs. of gold per ton of concentrates, while the concentrates vary from 1½ to 10 per cent. of the total amount of ore treated. It is unusual for the writer to receive samples of concentrates which run under ½ ounce, although in some few cases they will run only 3 or 4 dwts. per ton. He has proved by experiments in his laboratory that the concentrates are capable of being economically treated by roasting and chlorination or bromination, and in the majority of cases by cyanide of potassium.

The concentrates from most of the mines are mainly composed of arsenical iron pyrites, those from the Montague and Uniacke mines are rich in copper pyrites, and also contain galena and blende in considerable proportions.

No scientific attempt has ever been made to treat these concentrates. A chlorination works was started at Waverley, the writer's experience being that the concentrates at Waverley are the poorest of any district in the province. The writer has been unable to obtain any reliable record, but has been told that large quantities of salt were used in the roasting, and the gold was lost in that process. Anyhow, it resulted in failure and was abandoned. An attempt to treat the tailings by cyanide of potassium was tried at Brookfield by people without experience of the process, and also resulted in failure. At the present time a chlorination works is being erected near Chester, a district where the concentrates are rich, and the writer hopes that the attempt may prove successful.

Professor Hind states:—"From careful assays of numerous parcels of tailings as they came from the mill and selected indiscriminately, the average quantity of gold contained was found to exceed 4 dwts. per ton." The writer's experience of samples of tailings sent to his laboratory gives an average in excess of that amount; but such an average would be unfair, because it contains several assays considerably in excess, and in some cases containing considerable quantities of auriferous mercury; it also includes assays of tailings, the ore of which never contained any appreciable amount of gold. These two factors make it extremely difficult to strike a fair average.

Prof. Hind gives as an instance of the way mines were worked 20 years ago the workings on the Tudor lode at Waverley. "The number of shafts by different companies on these lodes within a mean distance of 2,000 feet is 54, having a mean depth of 200 feet. This is equivalent to a shaft to every superficial area of 47 feet." Mr. John E. Hardman is now working this property for the Tudor Gold-Mining Company, by a series of levels and cross-cuts from a main shaft, and the writer is indebted to him for the following particulars of working expenses:—"The property has been worked for three consecutive years; the yearly average yield has been from 4 to 5½ dwts. per ton; the average width of the quartz vein has been and is 12 inches. The cost of mining the quartz per ton has varied from \$1.25 upwards. The average cost per ton for mining, milling, and incidental expenses for last year was \$3.20; this is from a depth exceeding 225 feet, and as deep as 400 feet. The costs include pumping, hoisting and all milling work. The milling cost and incidentals include salaries and office expenses, but excluding development and exploitation."

Many mines in Nova Scotia to-day are unfortunately not worked with the same degree of economy, and the writer regrets that the Tudor mine is an exceptional case, but it shows what can be done with a proper scientific knowledge of methods of mining.

The gold-miners of Nova Scotia have latterly been turning their attention to the large intercalated belts of lower-grade ore, and in this lies the future of gold-mining in this province.

As an instance the writer may quote the Richardson mine in the Stormont district, the lode has a minimum width of 6 feet, and a maximum width of 17 feet, with an average width of about 11 feet. Its yield runs from 4 to 8 dwts., with an average yield in excess of 5 dwts. of free-milling gold, the concentrates are totally disregarded, as at many other mines. This lode has been milled and mined for \$2.27 per ton, including cost of pumping, management and office expenses, no allowance being made for wear and tear of machinery.

The majority of paying mines to-day are old workings which the old miners (most of whom were brought up as "tinkers, tailors, soldiers, sailors, apothecaries, or ploughboys") through lack of knowledge considered exhausted.

A typical instance may be quoted in the Hardman and Taylor property at Oldham. An English company sank £16,000 in this property without returning any dividends. Twelve years ago Mr. Hardman assumed the management, and has taken from it, without expending any large amount of capital, over \$500,000 worth of gold, while in some years the profits exceeded \$40,000. Through Mr. Hardman's kindness the writer is able to give the following particulars:—

The Dunbrack vein has been the chief producing vein during the past ten years, over \$400,000 having been obtained during that time from 7,600 tons of quartz. Several phenomenal yields have been recorded from this vein, such as in August, 1885, when 125 ozs. were returned from 240 tons, and in 1890 when 37 tons yielded 1,037 ozs., and in the same year 12 tons yielded 530 ozs. In 1891, 48 tons yielded 757½ ozs., and in the same year 88½ tons gave 1,084 ozs. In August, of 1893, 2 tons gave 250 ozs., or at the rate of 125 ozs. per ton. This year was the largest in the history of the district, the gross yield being 62,000 dollars. The Dunbrack vein has been opened by five shafts or inclines, varying from 157 to 483 feet in depth, and by levels at 150, 250, 300 and 450 feet; from the 450 level a winze was sunk 124 feet, making the greatest depth on the incline 574 feet, equivalent to about 407 feet vertical depth.

The workings are intersected by several small slides or faults, from a few inches to 6 or 7 feet in width, and are cut by two main dislocations, one of about 112 feet, which has been cut through in each level. The other large fault is supposed to be about 125 feet in extent, but no workings have as yet been carried beyond that fault.

The concentrates from this mine have been collected, and average from 65 to 70 dollars per ton.

Other instances of old mines being successfully reopened may be cited, such as the

*Paper read before the Fed. Inst. of Mining Engineers.