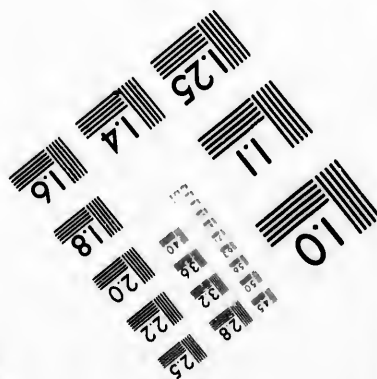
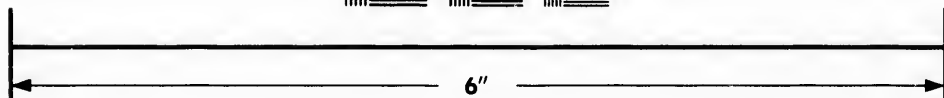
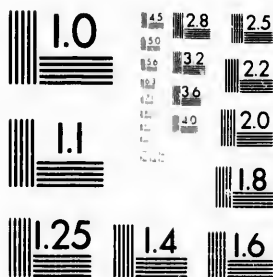


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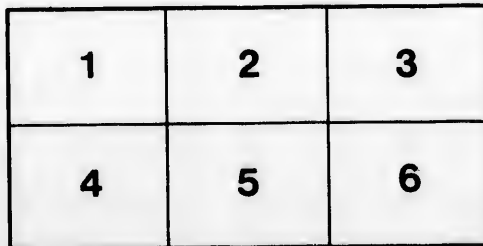
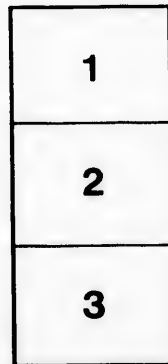
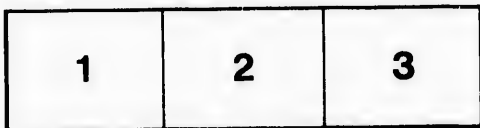
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REPORT

UPON

THE PROPERTY OF THE

Canada Consolidated Gold Mining Co.

AT

MARMORA, ONTARIO.

BY

RICHARD P. ROTHWELL, Mining Engineer,

*Editor of the Engineering and Mining Journal.*

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THE PROPERTY OF THE

## CANADA CONSOLIDATED GOLD MINING CO.

AT

MARMORA, ONTARIO.

BY

*RICHARD P. ROTHWELL, Mining Engineer,*

Editor Engineering and Mining Journal.



NEW YORK, 1880.

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## INTRODUCTION.

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Though the following report is given as an expert opinion, and no professional responsibility is sought to be avoided, yet it is proper to state that I am now pecuniarily interested in the property. The facts herewith presented and the conclusions deduced from them are given as the basis upon which I have myself invested a very considerable sum. My faith in the value of the property being sufficiently demonstrated by the investment of my own money, it remains only to give the reasons for this faith in such detail as to enable others to judge for themselves whether it be well grounded or not. This I endeavor to do in the following pages.

R. P. ROTHWELL,

*Mining Engineer,*

*Editor Engineering and Mining Journal.*

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# The Canada Consolidated Gold Mining Company's Mines.

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## I. GEOGRAPHICAL POSITION, MEANS OF ACCESS, COST OF TRANSPORTATION, ETC.

About thirty miles north of the city of Belleville (which is situated on Lake Ontario), and in the township of Marmora, Ont., is found a belt of gold-bearing quartz veins, which have now been shown to contain immense quantities of ore of a highly profitable quality. The mines are situated on the Moira River, in a well-wooded, rolling, agricultural country, where the roads are good and level, and the distance to the railroad, at the town of Madoc, is about ten miles, and to Stirling, on another railroad, is about sixteen miles. During the present year, it is expected that the railway will be completed to within three or four miles of the mines. At the present time, hauling from the mines to Madoc can be contracted for at from \$1.25 to \$1.50 per ton for the year through; during the winter, hauling on sleighs costs much less than during the summer on wagons. The cost of hauling is based on the current rate of \$2 to \$2.50 per day for two-horse teams, including the wages of the driver and the keep of the horses.

## II. CHARACTER OF THE VEINS AND OF THE ORE.

The gold-bearing veins are quartz-filled true fissures in syenitic granite, with micaceous or talcoid slates forming the walls of, and horses in the veins. This talcose slaty rock is clearly the product of the chemical decomposition of the syenite along the fissure, where it and quartz form the gangue

for an arsenical gold-bearing iron pyrites (mispickel). The magnesia of the talc comes from the hornblende in the syenite. The mispickel is found generally in a crystalline form, though sometimes in heavy amorphous masses running in beds through the quartz. Considerable quantities of crystallized calc-spar also occur irregularly in the veins.

Some four or five parallel veins have been proven to exist in a belt of 500 or 600 feet in width, running through the property of the company for a length of over three quarters of a mile, while the main vein has been opened on adjoining properties, making a total proven length of this great fissure of about three miles on the vein, a fact which, next to actual sinking, may be considered the best proof of the continuance in depth of the veins. Three of these veins have been proven on this property by costine pits and shafts sunk at short intervals along their outcrops, to depths varying from 15 to 150 feet. In this manner, the east or main vein has been thoroughly explored over a length of about 800 feet by shafts of from 40 to 150 feet in depth; these have, in every case, been in pay-ore all the way; their lowest points are now in as good ore as has been found on the property; and they have shown this vein to have a thickness exceeding 20 feet in many places, and averaging probably 10 or 12 feet; while the middle and west veins, though smaller, have still apparently a thickness of three feet and upward. On the Hawkeye property, the west vein has been opened to a width of about 12 feet at a depth of about 60 feet.

The gold is found as free gold principally in the arsenical sulphurets, but it occurs also in the quartz, where it is often plainly visible. The proportion of sulphurets to quartz in the vein has been ascertained by repeated tests; it varies from 10 to 60 per cent in weight of the entire vein-stuff, and these sulphurets carry from thirty to several hundred dollars per ton, while the entire filling of the vein, without any sorting whatever, has been found, by careful sampling of over six hundred tons in five-ton lots, to run from \$10 to \$25 gold per ton and average about \$20, as will be seen in the annexed record

of sampling in actual milling operations. Selected samples have been found to carry over a thousand dollars to the ton; but the conclusions arrived at and stated in this report have been based solely upon working results, on large quantities of the ore treated just as it came from the mines without any selection whatever, and they are believed to represent figures which will be realized steadily in actual working operations.

The veins are beyond all doubt true fissures in syenitic granite—very similar to the famous mines of Cornwall, Saxony, and other parts of the old world, where they have been worked with profit for a hundred years—while their great proven length and thickness on this property put beyond any reasonable doubt their continued productiveness to the greatest depths.

It is not, of course, expected that the veins will be of uniform thickness throughout, or that the ores will be equally rich in every place; on the contrary, the fissures will open out in some places and pinch in others, and the ore itself will be far richer in some parts of the vein than in others; but the fact that not a single one of the five-ton samples (representing over 600 tons) carried less gold than would leave a handsome profit after deducting the cost of mining, milling, and loss in treatment, justifies the belief that pay-ore will be found throughout the entire length (nearly 1000 feet) already proven of the main chimney.

The ores, which, as already stated, are arsenical sulphurets, are in that condition in which they occur to the greatest depths, and their richness, with the usual fluctuations, has thus far increased as depth has been attained. The yield is more than double that of the Homestake, Black Hills, Dak., ores (that come from somewhat similar veins), which have paid such magnificent returns during the past two years that the stock of that company is even now (August, 1880), when every mining stock is depressed, selling at the rate of over \$3,000,000 for the property. The quantity of ore on the Canada Con. property being enormous, the cost of treatment extremely low, and its richness so much greater than that of the Homestake

ores, there is no reason why this property may not in the near future command as high a price as that famous mine.

### III. HISTORY OF THE DISTRICT.

Gold was first discovered in this district in 1865 as free gold in quartz and mispickel, and sporadic attempts have since been made at two or three points to treat the ores, chiefly by raw amalgamation. As might have been anticipated from the nature of the ore, but a very small proportion of the gold was saved in this way, while the expense of treatment in the small and primitive mills adopted was great and the loss of quick-silver heavy. There was neither experience nor technical knowledge available at the time, and no sufficient capital to put up suitable works or to develop the mines, hence they have lain idle all these years without a single serious effort to work them on an economical basis. Nevertheless, many tests of the ores were made, some on quite an extensive scale, in reduction works in the United States and England, and the results were invariably highly satisfactory; so much so, indeed, that the owners of the only developed properties, though financially unable to work the mines themselves, esteemed them so highly that they would not sell at such a price as would offer an inducement for others to purchase. Now, for the first time, by consolidating a large number of tracts, and thus making a property of sufficient magnitude to justify the establishment of large works, has it been possible to make these valuable ores available.

### IV. EXTENT OF THE PROPERTY.

The property included in the present enterprise has a length of about 4200 feet from north to south on the strike of the several known veins, and embraces—

	ACRES.	
Portion of lot 9 in VIII. Concession of Marmora.....	123 1/2	} Purchased from the Gatling Gold and Silver Mining Company.
West 1/2 of lot 10 in IX. " " .....	100	
North 1/2 of lot 31 in VI. " " .....	100	
North 1/2 of lot 26 in XI. " " .....	60	
Portion of West 1/2 of lot 25 in X. Concession of Marmora...	35	
South 1/2 of lot 24 in IX. Concession of Hungerford .....	100	



	ACRES.	
South part of East $\frac{1}{4}$ of lot 9 in VIII. Concession of Marmora	37 $\frac{1}{2}$	} Purchased from Gen. J. M. Tuttle.
North portion of East $\frac{1}{2}$ of lot 8 in VIII. " "	25	
West $\frac{1}{2}$ of East $\frac{1}{2}$ of lot 9 in VIII. " "	50	} Purchased from Devine, Anger & Christie.
West $\frac{1}{2}$ of lot 10 in IX. Concession of Marmora	100	
West $\frac{1}{2}$ of East $\frac{1}{2}$ of lot 10 in IX. Concession of Marmora	50	
Part of lot 27 in III. Concession of Marmora	130	
East $\frac{1}{2}$ of East $\frac{1}{2}$ (except 5 acres) of lot 10 in VIII. Concession of Marmora	45	} Under negotiation from Hawkeye Gold Mining Company.
Total	851 acres.	

The whole containing over 850 acres, some of which is good farming land, and most of it is well timbered. On nearly all of these lots, gold has been found in greater or less quantity, though the veins have been opened only on the lots in the VIII. Concession. On lot 27 in the III. Concession, is a very promising vein of galena. There is also on this lot a stream of water with a fall of 15 or 20 feet, which would be available in concentrating the lead ore.

The chief mineral wealth upon the property of the Canada Consolidated Gold Mining Company consists of the three or four large gold-bearing quartz veins which run through the lots 8, 9, and 10, in the VIII. Concession of Marmora, and which have been developed to such an extent as to place their value beyond question.

As under Canadian laws mineral veins can not be followed beyond the limits covered in the surface location, care has been taken to secure such an extent of property as will include the veins to any workable depth.

#### V. AMOUNT OF DEVELOPMENTS.

The various shafts and surface openings as they existed at the date of their examinations are described in detail in the accompanying reports of Messrs. R. H. Stretch and Thomas Couch. Reference is made to Mr. Stretch's map to show the location of the veins and of the several shafts; it is not therefore necessary to enter into any further detail here than to say that the main shaft, which, at the date of Mr. Stretch's visit, was 105 feet in depth, is now 150 feet, and the ore has steadily

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improved, that now coming out showing constantly free gold.

The chief developments consist of a number of shafts varying in depth from a few feet to 150 feet (August), situated at intervals along the different veins, as shown in the accompanying map, and practically proving the main veins for a length of 700 or 800 feet, and to a depth of 150 feet, so conclusively as to put the ore technically "in sight" over that extent of vein area. About 200 feet in length by 100 feet in depth of the middle vein may also be considered as similarly proven, while the continuation of the veins beyond these limits and their probable productiveness are demonstrated by a great number of surface openings and outcroppings.

The shafts which have been sunk have been on the main vein 7 x 8 feet in their smallest parts, and the deep shaft has been opened out for a great part of its depth to a width across the vein of 18 feet, while it is still in quartz on the hanging-wall side. The thickness of the vein at that point is therefore proven to be more than 18 feet, and it probably exceeds 20 feet; while in the Tuttle shaft—the only other place where there has been an opportunity to determine it—the thickness of this vein exceeds 25 feet. In the absence of more cross-cuts showing the actual thickness of the vein at a number of points, it would not be safe to assume any such thickness as an average for the vein throughout; but it is abundantly evident that the vein is enormous; and as the developments have been in pay-ore throughout, it is clear that the value of the proven part of it, say 700 feet in length by 150 feet in depth, is enormous, amounting to about 10,000 tons for every foot in thickness of the vein.

Mr. Stretch's map and report give clearly the amount of development on the other veins, no work having been done on them since the date of his visit.

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## VI. THE ORE IN SIGHT.

The ore in sight in any mine is that so proven as to leave no doubt as to its existence or its average value; but what can be counted as so proven will vary in the different classes of mineral deposits; thus, in pockets in limestone, which are extremely irregular and capricious, coming in and giving out suddenly, not only would we require the ore to be laid bare on all sides, but the levels and winzes should be so close together as to make the blocks of ore quite small, the uncertainty of the deposits making it unsafe to count as ore any large block of ground even where its periphery is all in ore; so it is also in deposits such as hematite iron ore, which is generally a deposition from springs.

An equal amount of caution should be exercised in estimating reserves in fissure-veins where the ore occurs in small chimneys or irregular pockets, especially where it is of very high grade; for the grade of the ore is as variable as its amount, and the variations in rich ore are so great as to modify immensely the value of the reserves. In low-grade ore, the variations are necessarily much smaller, and affect the value of the reserves much less; and if we have at the same time a regular, uniform vein, we can count with much greater certainty as "ore in sight" that one hundred feet on each side of and below actual openings than we could for fifty or even twenty feet on each side of openings in an irregular vein or pocket in rich ore.

In certain classes of mineral deposits—such as coal beds—we can count as "in sight" or as "reserves" all the area underlain by the bed where proven by shafts or bore-holes at intervals of even one or two thousand feet.

The veins in this district are proven by shafts and surface openings to continue over a length of several miles, and the east vein is developed on this company's property by shafts at intervals of a few hundred feet for a length of from 700 to 800 feet, and to a depth of from 40 to 150 feet, and on the

middle vein by four shafts to a length of several hundred feet, to a depth of about 50 feet. Each of these veins, wherever opened, has proved to be strong and the ore of very uniform quality, as will be seen by reference to the record of assays and mill-tests already made. The fact that not only where these shafts are sunk, but all along on the surface, the veins show immense outcrops of quartz, and, wherever sunk upon to a depth of even a few feet, show sulphurets, places it beyond any reasonable doubt, that they carry ore between the shafts of the same quality and in the same quantity as in the shafts. Indeed, few estimates of ore in sight in blocks driven completely around are as reliable as would be this counted to a depth of 150 feet.

No true fissure-vein in old rocks having the immense length and width that this has, and showing such remarkable uniformity in its ores, can be imagined as suddenly giving out in quantity or yield in a depth of a few hundred feet, and an estimate which should consider as technically *in sight* the ore 100 feet below actual openings on these veins, and 150 feet on each side of the shafts (the vein being proven at small intervals along the surface), would be a safer estimate of proven ore than in estimating 50 feet on each side of actual openings in most mineral veins. Such an estimate would generally be considered extremely conservative.

The quantity of ore "in sight"—that is, the quantity of ore that can be considered as proven beyond any reasonable doubt—has been variously estimated by the well-known experts who have examined the property, according to their respective ideas of what constitutes sufficient proof of the existence of the ore. Mr. Stretch counts as "in sight" not a single foot below the rich ore-bearing bottom of the shaft (which is now 45 feet below the point to which he counted the ore, and is in richer ore and the vein is wider than at the date of his examination) or a single foot beyond the end of the drifts (all in ore) in a vein which he counts to have an average thickness of 12 feet of ore; while Mr. Couch considers as beyond doubt or "in sight" in this vein a depth from the

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quantity of ore reasonable well-known to their of the extent of the shaft counted the at the date end of the an average considers as from the

surface to 150 feet, and 100 feet in length beyond the shafts, where they are sunk in ore and prove the vein of great thickness. Mr. Couch allows liberally for "horses" and other "accidents" in the vein, and assumes an average thickness throughout of only five feet. In this way he estimates as "in sight" some 61,000 tons, while Mr. Stretch estimates as fully proven 21,500 tons, and as "probably obtainable" 16,500 tons additional, or a total of 38,000 tons. Both believe that these amounts represent but a small part of the ore which will be obtained from these veins; for both are convinced that these great true fissure-veins which have been proven over such an enormous length will continue to be productive down to the greatest depths. But as a basis of *present* commercial value, they limit their estimates of ore "in sight" as above to what, in their opinion, was, at the date of their examinations, proved beyond doubt to exist and to be easily obtainable.

The developments which have been made in sinking shafts, etc., since these gentlemen examined the mines, have increased considerably the amount of ore actually demonstrated as "in sight," and we believe a very conservative estimate would now place it between 50,000 and 60,000 tons, while the "*probabilities*" increase in full proportion with the actually proven ore.

If we count as reserves the ore in the main vein, for a length of 700 feet, which all our explorations show to be "in pay," and counting only to the bottom of the main shaft, which is now in better ore than was found at any point nearer the surface, we would get  $700 \times 150 = 105,000$  cubic feet, or say, 10,000 tons, for every foot of thickness of the vein. And since this thickness wherever tested was from 10 to 25 feet, it would be safe to count 5 feet average thickness, as Mr. Couch has done, after deducting very liberally for "horses," or poor places, which, though not yet met with in any of the workings, may be expected in this as in all other mines. This would give 50,000 tons in this vein alone.

The middle vein would add several thousand tons of rich ore to this reserve.

Professor Chapman and Professor Rickard state, somewhat indefinitely, as "ore in sight," the amount of ore not actually proven, but which they do not in the least doubt exists in these veins to a very moderate depth, and they thus get, Professor Chapman 62,943 tons in a depth of 55 feet, and Professor Rickard over 100,000 tons in a depth of 100 feet. In the same ground Mr. Stretch estimates there will be found 82,750 tons.

The basis upon which Mr. Stretch arrived at his estimate will be found in the accompanying abstract of his report, and by reference to his map.

There are from 800 to 1000 tons of ore now on the dumps.

#### VII. YIELD OF THE ORE.

The ore from the veins on the Canada Consolidated Gold Mining Company's property is, as already stated, gold-bearing arsenical iron pyrites (mispickel) with a quartz and calc-spar gangue, free gold being frequently plainly visible in both the quartz and the mispickel. The veins also carry in small quantity iron pyrites, and in still smaller quantity copper sulphides. The ores contain also silver, but in such small quantity as to be of no practical value—indeed, it scarcely appears at all in the gold produced by amalgamation, which is of exceeding purity, some lots being 982 fine or over 23½ carats.

The amount of gold in the ore, though variable in small samples, owing to the fact that some of it is coarse, is remarkably uniform in large lots of ore taken as it comes from the mine. There is no waste in the veins except occasional horses of country rock, all the quartz from the entire width of the lode carrying more or less gold.

The gold-bearing contents of the ore have been determined by a vast number of assays of average samples taken from the various dumps, and by tests of large lots in various ways.

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The following memoranda summarize a number of the results obtained and give a good measure of the value of the ore :

ASSAYS OF AVERAGE SAMPLES OF ORES.

Twenty assays, made at the Geological Survey of Canada Laboratory, of samples from the Marmora mines, gave an average of 1.6367 ounces of gold, equal to \$33.81 per ton of 2000 pounds. Twelve of these samples were from the Gatling mines, and gave an average of 1.9107 ounces of gold, or \$39.47 per ton.

Prof. E. J. Chapman, of the University College, Toronto, an abstract of whose report on a portion of this property will be found in the Appendix, says : " I have made assays of its ores from time to time, and I have never failed to obtain from any sample (mispickel), as a minimum value, at least fifty dollars per ton." " The following results were obtained from samples collected very carefully, with a view to obtain the average amount of precious metal held by the undressed ore :

" No. 1, or East Vein—Gold, \$73.50 ; silver,  $\frac{1}{4}$  oz.

" No. 3, or Middle Vein—Gold, \$69.86 ; silver,  $\frac{1}{4}$  oz.

" O'Neil Shaft, middle vein—Gold, \$60.26 ; silver,  $\frac{1}{4}$  oz.

" On a former occasion, I obtained from a small sample of the Gatling ore \$112, and from pure mispickel \$156 per ton."

James Douglas, Jr., whose report on portions of this property will be found in the Appendix, says :

" A sample taken as fairly as possible from the ore piles on the Gatling Company's property, the five-acre lot and the Hawkeye lot, gives me in gold 1 oz. 5 dwts., value \$25.84, per ton of 2000 pounds."

Prof. W. T. Rickard, of London, whose report on this property is printed in the Appendix, says :

" I took samples from the various shafts and openings on each claim, and ground them together. \* \* \* I picked out a large quantity of pure mispickel, crushed and sampled and

assayed the same. \* \* \* I deducted the estimated amount of quartz associated with the mispickel, and then allowed fifty per cent for depreciation in the quality of the mispickel. The following results were obtained by careful assay :

“*Hawkeye ore* from three shafts, mixed mispickel—Gold, \$753.48 ; silver, \$15.71. Total, \$769.19.

“*Gatling five-acre lot.*—1 shaft quartz—Gold, \$200.93 ; silver, \$3.14. Total, \$204.07 per ton.

“*Gatling Co.*—From three shafts, mixed mispickel—Gold, \$351.63 ; silver, \$21.91. Total, \$373.54.

“*Gatling Co.*—O’Neil Shaft, third vein—Gold, \$376.64 ; silver, \$7.85. Total, \$384.49.

“*Tuttle Property*—Surface quartz—Gold, \$125.48 ; silver, \$4.70. Total, \$130.18.

*Average*—First class quartz and pure mispickel. . . . \$372 29  
 Deduct  $\frac{1}{4}$  ton for gangue in bulk, leaving. . . . . 74 46  
 “  $\frac{1}{2}$  ton for inferior mispickel, leaving. . . . . 37 23  
 “ for loss in reduction \$7.23, leaving . . . . . 30 00  
 —or net yield of ore in treatment \$30 per ton.”

F. W. Dahne, Esq., who dressed a lot of this ore sent to Swansea, says : “ The ore I treated contained before dressing 2½ ounces of gold to the ton (2240 pounds).”

Capt. Benj. Plummer, who examined these mines for Messrs. John Taylor & Sons, of London, carefully sampled the ores from the different openings, and had his samples assayed by Prof. Chapman, of University College, Toronto, who obtained the following as the average of a number of assays, gold counted at \$20.66 per ounce Troy :

Sample No. 19.	Gold,	\$38.65	per ton of 2000 pounds.
“ No. E.	“	24.87	“ “
“ No. F.	“	36.60	“ “
“ No. G.	“	24.74	“ “

Average, \$31.21.

The amount of silver in these samples never exceeded  $\frac{1}{4}$  oz. per ton.

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TESTS ON A LARGE SCALE.

Two barrels of average ore treated at Balbach's works, in Newark, N. J., yielded :

*From East Vein.*—Gold, \$23.76 ; silver, \$4.07. Total, \$27.83 per ton of 2000 pounds.

*From O'Neil Shaft.*—Gold, \$25.62 ; silver, \$4.39. Total, \$30.01 per ton.

Four barrels of ore sent to Messrs. Richardson & Co., Swansea, yielded as follows (assays being reduced to dollars per ton of 2000 pounds) :

*Tuttle Shaft.*—Gold, \$93 ; silver, \$7 per ton (2000 pounds).

*Gatling Co.'s Deep Shaft.*—Gold, \$37.21 ; silver, \$20 per ton (2000 pounds).

*Gatling Co.'s A Shaft.*—Gold, \$23.15 ; silver, \$18 per ton (2000 pounds).

*Gatling Co.'s O'Neil Shaft.*—Gold, \$23.15 ; silver, \$100 per ton (2000 pounds).

The report for a large lot of ore from the O'Neil shaft, subsequently sent to the same Swansea parties, was as follows :

For 19.8 tons : Gold, \$23.15 ; silver, \$0.50 per ton of 2000 pounds.

For 9.9 tons : Gold, \$27.90 ; silver, \$0.75 per ton of 2000 pounds.

For 4.4 tons : Gold, \$55.81 ; silver, \$0.50 per ton of 2000 pounds.

Analyses of pure mispickel made by Thomas Thomas & J. Hernaman James, Assayers in Swansea, to Messrs. Richardson & Co., were as follows (the gold being reduced to dollars in a ton of 2000 pounds at \$20.67 per oz.) :

	SMALL CRYSTALLIZATION.	LARGE CRYSTALLIZATION.
Peroxide of iron .....	54.00	56.00
Silica .....	0.51	0.08
Sulphur .....	19.08	18.13
Arsenic .....	25.70	23.00
Nickel .....	Trace	Trace
Silver (per ton of 2000 pounds) .....	"	\$6.50
Gold (per ton of 2000 pounds) .....	\$306.95	\$200.67

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Mr. E. W. Harmon, in 1876, tested the ores from these properties in the interest of Boston parties, who had a patent process for treating sulphuret ores. The following are the results obtained by Mr. Harmon from average samples selected by himself :

Per ton of 2000 lbs.		Per ton of 2000 lbs.	
No. 1.	East Vein Gatling Co., Gold, \$123 81	No. 12.	Gatling five acres. .... \$595 12
" 2.	" " " " 37 84	" 13.	" " " " 37 84
" 3.	" " " " 37 84	" 14.	Williams mine, tailings. .... 34 40
" 4.	" " " " 75 08	" 15.	Gatling Co.—Shaft, free gold 440 32
" 5.	Middle Vein " " 48 10	" 16.	Gatling, roasted steely ore amalgamated..... 48 16
" 6.	" " " " 116 96	" 17.	Gatling rich pyrites, raw treatment..... 1,265 02
" 7.	West Vein " " 41 28	" 18.	1 lb. average material from first test by a stirring (amal- gamating process. .... 52 46
" 8.	" " " " 120 40		
" 9.	Sample from all of foregoing 61 02		
" 10.	Gatling South..... 41 28		
" 11.	" five acres..... 550 40		

18.7 tons of ore from the several shafts of the Gatling Company's mines were then treated by the same parties—the process being roasting and amalgamating—the roasting was very imperfect, being effected in a revolving cylinder only 3 feet diameter and 12 feet long, heated from the outside, and with a strong draught of air forced through it by a "blower." The consequence was, that the flue dust contained much gold, and the roasted ore carried 6 per cent of sulphur.

The following were the assays of lots of from 2 to 3 tons each :

ORE.		TAILINGS.		ORE.		TAILINGS.	
No. 1.....	\$30.90	\$10.30	No. 4.....	\$41.20	\$6.87		
" 2.....	41.20	6.87	" 5.....	51.50	8.58		
" 3.....	65.23	6.87	" 6.....	44.71	12.04		

Average gold in 18.7 tons was \$35.46 per ton, counting gold at \$20 per ounce.

Gold actually saved was \$25.32 per ton, or 71 per cent of assay value, while there was still in the bottoms in flue dust returnable for retreatment, obtainable gold that would have made the yield \$27.31 per ton, or 77 per cent, and the tailings were extremely rich and could easily have yielded on shaking tables or belts gold enough to have made the actual yield \$30 or \$31 per ton.

Captain Thomas Couch, in his examination of these mines in February, 1880, carefully sampled the several mines, taking one and two-ton samples of the ore just as it came from each of the shafts and levels, without sorting.

The results were as follows :

Tuttle shaft, 2 tons.....	Gold, \$26.46 per ton.	Silver, 1'28 ounces.
Deep shaft levels, 2 tons.....	" 16.33 "	" '79 "
Middle Vein, 2 tons.....	" 32.65 "	" 1'58 "
N. Hawkeye shaft.....	" 7.85 "	" '38 "
S. Hawkeye shaft.....	" 7.44 "	" '36 "
Concentrates (Tuttle shaft).....	" 137.48 "	" 6'65 "
" (Levels deep shaft).....	" 65.00 "	" 3'14 "
" (Middle vein).....	" 167.48 "	" 5'20 "
" .....	" 129.19 "	" 6'25 "

Assayed by W. E. Gifford, 54 Pine street, New York.

Mr. R. H. Stretch sampled the mines by taking one-ton lots of the ore just as it came from the several shafts and levels without sorting, and the result of his assays were as follows :

Deep shaft, bottom.....	\$21.50 per ton.	A shaft (3 samplings).....	\$17.92 per ton.
N. level.....	9.00 "	Tuttle shaft.....	13.00 "
S. level.....	7.50 "	Average after parting; gold..	13.06 "

R. P. ROTHWELL'S TESTS.

By far the most exhaustive tests of these ores were made under my own direction. Having secured a working bond upon these properties, I carried on mining and milling operations with a force of eighty or ninety men during nearly four months. During this time, seven shafts were worked upon and attained depths of from forty to one hundred and ten feet; and two levels of forty feet each in length. Three of these shafts, namely, the Tuttle, the A shaft, the deep shaft, and two levels were those upon which the most of the work was performed, and it is to the ore from these that the following remarks are confined. These openings prove a length along the main vein of about seven hundred feet, as may be seen by reference to the accompanying sections from Mr. Stretch's report.

The ore extracted *without any sorting whatever* was taken to the mill; it was then weighed and crushed for the greater part in five-ton lots, every twentieth shovelful as it came from the Blake crusher being laid aside for a sample. The samples of five-ton lots were crushed fine, quartered down as usual, and assayed; thus, one hundred and eight lots, nearly

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all representing five tons of ore, were assayed separately, while fifty-one tons from the Tuttle shaft were sampled in the same careful manner in one lot by Mr. Thomas Macfarlane, of the Wyandotte Silver Smelting Company. The assays of these several samples are given in the following table. It will be noted that the richer five-ton lots were obtained by selecting the heavier sulphurets from the balance of the ore in the ore-house so as to demonstrate the effect of rough hand-sorting; the low assays were therefore of second-class ore; the whole number of assays gives, however, the average yield of the ore just as it comes from the mine without sorting. The higher assay numbers (last assays made) were, in general, from ore mined nearest the surface, and which accordingly was found at the center of the dump. Nearly one half the dump was milled, and the last milled came from the center of the dump.

NOTE.—The proportions of gold and silver in the assay buttons were obtained by parting 89 buttons in one operation. J was found the average was 68 per cent gold, 32 silver. The following table gives only the gold, or 68 per cent of the weight of the button:

*Record of Assays of Canada Consolidated Gold Mining Company's Ores, mostly from the Gutting Mine—108 samples, mostly 5 tons each, representing a total of 515 tons.*

1.....	\$33 04	29.....	\$6 33	56.....	\$9 84	83.....	\$10 90
2.....	14 06	30.....	8 08	57.....	42 18	84.....	11 07
3.....	9 84	31.....	25 31	58.....	28 12	85.....	9 49
4.....	18 98	32.....	7 03	59.....	27 06	86.....	7 33
5.....	43 04	33.....	33 74	60.....	14 76	87.....	4 57
6.....	15 11	34.....	7 38	61.....	39 37	88.....	5 08
7.....	11 30	35.....	7 38	62.....	11 35	89.....	32 34
8.....	10 55	36.....	6 50	63.....	9 84	90.....	7 03
9.....	14 76	37.....	12 65	64.....	23 20	91.....	7 73
10.....	8 44	38.....	16 17	65.....	16 17	92.....	5 62
11.....	11 60	39.....	9 84	66.....	9 49	93.....	33 04
12.....	8 79	40.....	18 28	67.....	8 44	94.....	32 34
13.....	9 84	41.....	21 79	68.....	12 05	95.....	15 47
14.....	9 14	42.....	14 76	69.....	10 72	96.....	6 33
15.....	7 72	43.....	7 03	70.....	10 90	97.....	9 49
16.....	11 25	44.....	10 55	71.....	6 33	98.....	17 58
17.....	16 17	45.....	7 73	72.....	5 27	99.....	17 58
18.....	14 06	46.....	4 92	73.....	8 44	100.....	9 14
19.....	7 38	47.....	9 14	74.....	9 84	101.....	5 45
20.....	11 25	48.....	53 43	75.....	5 62	102.....	12 83
21.....	9 49	49.....	5 62	76.....	7 34	103.....	13 36
22.....	7 03	50.....	5 62	77.....	12 48	104.....	4 92
23.....	9 14	51.....	5 62	78.....	11 07	105.....	15 11
24.....	8 79	52.....	17 58	79.....	5 98	106.....	5 62
25.....	11 25	53.....	13 71	80.....	7 03	107.....	28 12
26.....	8 44	54.....	18 98	81.....	10 90	108.....	11 85
27.....	13 28	55.....	8 44	82.....	8 26	109.....	7 03

Average, 108 samples, \$13.37 gold per ton of 2000 lbs.

From these tests we find the average assay value of 515 tons from the Gatling property, as determined by 108 separate assays made by A. Thies—

Was in fine gold, per ton.....	\$13 37
By check assays by Prof. Richards, of Boston, and Gifford, of New York. ....	14 75
Average per ton.....	\$14 06

The ore from the Tuttle shaft was found to be much richer than that from the same vein on the Gatling property. The average of 63 tons sampled by Thomas Macfarlane and Rothwell, and assayed by Gifford and Thies, was \$24.88.

And assuming, as would be fair, that seven tenths of the reserves in the main vein are of Gatling ore, and three tenths of Tuttle ore, we would get, as the average value of the main vein ore, \$17.30 per ton.

The ore from the middle vein has been found richer than that from the main vein. Lots aggregating 12 tons were sampled under my direction, and averaged \$30.82 per ton—a figure lower than that given for larger lots shipped to Swansea, to New Hampshire, and elsewhere. Assuming the same yield for the ore from the O'Neil shaft, and allowing only one tenth of the reserves of ore to be in the middle vein and O'Neil shaft, and nine tenths of the reserves to be in the main vein, we would get

*The average assay value of the ore in reserves \$18.65 gold per ton.*

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34.....	11 07
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37.....	4 57
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42.....	5 62
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49.....	17 58
50.....	9 14
51.....	5 45
52.....	12 83
53.....	13 36
54.....	4 92
55.....	15 11
56.....	5 62
57.....	28 12
58.....	11 95
59.....	7 03

## VIII. VALUE OF THE ORE IN SIGHT.

Tabulating the data contained in the preceding pages, we get the following exhibit:

EXPERT.	ORE IN SIGHT.	AVERAGE ASSAY VALUE PER 2000 LBS., GOLD.	NET PROFIT PER TON.	NET VALUE OF RESERVES.
Prof. E. J. Chapman.....	63,000	\$50 00	.....	.....
Prof. W. T. Rickard.....	118,000	33 50	\$23 00	.....
James Douglas, Jr. (from Hawkeye, 5 A, and Gatling Co. lots).....	.....	25 84	12 50	.....
F. W. Dahne (Ores sent to Swansea).....	.....	45 00	.....	.....
Messrs. Francis and Rouse (tests made by Richardson & Co.).....	.....	40 00	16 00	.....
E. W. Harmon (187 tons Gatling Co.).....	.....	25 46	.....	.....
Capt. Benj. Plummer.....	.....	31 21	6 53	.....
Capt. Thos. Couch (Main Vein, \$31.39; Middle Vein, \$32.65; average in reserves, \$23 per ton.....)	61,500	23 00	14 90	\$918,000
Prof. R. H. Stretch (Main Vein).....	28,000	13 06	8 50	323,000
R. P. Rothwell (about 600 tons in 7-ton lots).	50,000	18 65	11 50	575,000

From the above table, giving the average results of the careful sampling of these mines by well-known and reliable experts, we note the remarkable uniformity of the results arrived at, and the unanimity of the opinion that large profits can be made by the treatment of these ores. The lowest value found in sampling was by Mr. Stretch, and his figure results from the fact that at that particular time the drifts happened to be in low-grade ore, and only one fifth of his samples was taken from the Tuttle shaft, while no sample at all was taken from the middle vein, which all our assays show runs fully \$30 per ton. Moreover, Mr. Stretch's samples were but *one* ton each, and therefore do not give as reliable an average value as the elaborate series of tests, on about 600 tons, made under my direction. In fact, I have no knowledge of a single instance where a mine was as carefully and

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thoroughly sampled as this, and the results given above (\$18.65 gross or \$11.50 net per ton) I believe are such as can be obtained or surpassed in regular working operations. With this conviction, I have myself invested in this property, and I refer to these results as the basis of my favorable opinion of these mines.

Captain Plummer, who gives \$6.53 per ton as the net profit on the treatment of an ore carrying \$31.21, makes allowances for cost of mining and milling and loss which none but an English company would tolerate.

The net value of the ore in sight is obtained in my own estimates by allowing 20 per cent loss (\$3.73) [by chlorination 91 per cent of the assay value of the raw ore was obtained, the loss (9 per cent) occurring principally in the handling and roasting; some of the gold carried over in the arsenic fumes could be recovered in a subsequent operation], and deducting \$3.42 per ton from the remainder (\$14.92) as the total cost of mining and milling, leaving the net profit \$11.50 per ton.

The net value or profit realizable from the reserves or ore in sight in a prudently managed works, treating not less than 100 tons a day, can very safely be set down at over *half a million dollars*, and to this must be added the value of the work done on the mines, the mill, houses, supplies of various kinds, water-power, etc., which would certainly increase this to over \$650,000; and this allows nothing for the prospective value, or value of the ore beyond the present insignificant explorations. It may be confidently assumed that one year's developing work will increase the amount of "ore in sight" to a net value of *at least a million and a half of dollars*, or say three times what it now is.

ng pages, we

NET PROFIT PER TON.	NET VALUE OF RESERVES.
.....	.....
23 00	.....
12 50	.....
.....	.....
16 00	.....
.....	.....
6 53	.....
.....	.....
14 90	\$918,000
8 50	323,000
11 50	575,000

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## IX. COST OF MINING AND MILLING.

The cost of mining is based upon wages at \$1 per day for common labor, and \$1.25 per day of ten working hours (7 A.M. to 6 P.M., less one hour at noon), powder at \$3 per keg (25 lbs.), dynamite 40 cents per lb., best drill steel at 12 to 15 cents per lb., and other supplies in proportion. Miners and hand-drilling can sink shafts 7 x 8 feet section, or drive levels, a 6 x 6½ feet section at the rate of about \$12 to \$13 per foot including supplies. With the use of rock-drills, and pumps, and hoisting-engines, driven by compressed air, this cost will certainly be reduced to one half or less, as has been done in the Calumet & Hecla mines on Lake Superior. The motive power is a waterfall sufficient for all purposes nine or ten months in the year. The cost of stoping with drills will not exceed 75 cents to \$1 per ton where the vein is as large as it has heretofore been found, and the average cost of mining and delivering on the surface, including a fair amount of dead-work, should not exceed \$1.75 per ton, after the mines have been opened to a capacity of 100 tons a day, say, after six months' work. Within sixty days from commencing work, there will be three shafts sinking and eight levels driving in ore; and within six months, fully twice the number of places will be driving. There can be no question, therefore, but that, should the vein continue as it has been up to the present time, and as it is confidently expected will, there will be no difficulty in securing an output of from 100 to 150 tons a day in six months, and more than double that amount within a year after commencing work.

The cost of milling is based on wages from \$1 to \$1.25 per day, wood \$1 to \$1.25 per cord, castings 3½ to 4 cents per lb. an abundant water-power, etc.

Milling operations will consist in coarse crushing, with stamps or rolls, concentrating with automatic jigs and perhaps Frue belts, roasting the concentrates in a revolving cylinder or some other form of automatic roasting furnace, pulverizing the roasted ore, chlorinating or amalgamating it, probably



former, which has given excellent results in the tests thus far made, filtering, precipitating, retorting, and melting the gold. The cost of this treatment has been estimated by Mr. Stretch at \$1.25 per ton, and by Mr. Couch at \$1.30 per ton. And when we consider that the crushing and jigging will not cost 75 cents a ton (it costs about this at Lake Superior), and that the roasting is on only about two fifths of the original ore, and the cost of chlorination is on less than one third of the original ore; and assuming chlorination and precipitation and pumps, to cost \$1.50 per ton, the cost reduced to the ore mined would be but 5 cents per ton, or the entire milling cost, \$1.25; and mining \$1.75, we see how safe is the estimate of Messrs. Stretch and Couch at \$3.25, and how much more than safe is my own figure, including all contingencies, of \$3.42 per ton.

#### X. NET PROFITS.

The average assay value of the ore having been fully demonstrated to be about \$18.65 per ton, the loss in treatment from 9 to 20 per cent (as we use chlorination or amalgams from amalgamation, and we assume the least favorable figure); and the cost of mining and milling is assumed as a very safe figure at \$3.42 per ton, we get the *net* profit \$11.50 per ton. On a business of 100 tons a day, this would leave a net earning of over \$25,000 a month.

Within a year, should the veins continue as is expected from all present knowledge of them, the output should be from 200 to 250 tons a day, and the net profits should then amount to from \$50,000 to \$60,000 per month, while the reserves of ore in sight should increase still more rapidly than the output.

It should not be overlooked that the arsenious acid which is collected in the condensation chambers of the roasting furnace will amount to about 20 per cent of the weight of the concentrates roasted, and has a commercial value which will probably net the company fully 50 cents per ton on the ore milled, or \$1.50 per ton on the ore roasted. This im-

portant item has not been included in the above estimate of net profits.

#### XI. ADVANTAGES OF THE PROPERTY.

1. The mines are situated in a rich agricultural district with supplies of all kinds remarkably cheap. There are excellent macadamized roads and the railroad within a few miles of the mines; and there will soon be a telegraph line the company furnishing only the poles.

2. *Wood and Lumber* are abundant. The best hard-wood delivered in the mill-yard costs \$1.25 per cord. Timber and lumber are proportionately cheap.

3. *Water*, which is as essential to the success of a mining enterprise as is rich ore, is here so abundant that a fall of over 30 feet on the Moira River will furnish, for nine or ten months of the year, all the power necessary to work the mine, drive the hoisting-engines, pumps, rock-drills, etc., and during the remaining two or three months will need only a little assistance from a steam-engine.

4. *The Titles* to the property are perfect in every respect and have been examined by John Bell, Esq., of Belleville, Solicitor to the Grand Trunk Railway Company.

*Taxes.*—Mines and minerals are not taxed under Ontario laws, and only the surface valued for agricultural purposes, and surface improvements are subject to a light property tax.

5. *The Mines* are developed sufficiently to show a present net value of ore in sight alone exceeding the entire capital of the company, while the mine and surface improvements and water-power are of great value. The mines are now in production and capable of producing largely from the start.

6. *Working Capital.*—More than one fifth of the entire stock of the company has been set aside as a working capital—thus amply providing for the erection of the most approved

the above estimates, appliances for treating the ore, and the fullest development of the mines with the best machinery.

PROPERTY. 7. *The Veins* are proven to be very large and continuous in depth and length, and experts are unanimous in the opinion that they will continue to be equally productive to the greatest depths, as the similar veins in Cornwall and Saxony have been proved to be.

agricultural districts cheap. There has been proved to be a telegraph line. 8. *The Ores* are very abundant, of remarkable uniformity, and are easily treated. The cost of mining and milling is less than at almost any other mines in America, and the net profit per ton greater than in many of the high-grade camps of the West, while the investment is but a small part of that required there.

The best hard-worked cord. Timber success of a mine abundant that a fall furnish, for nine or ten years to work the machinery, drills, etc., and does not need only a little stock in every respect. 9. *The Management* of the mines will be conducted with the utmost energy and skill, and will be free from the stock-jobbing influences which characterize so many mining enterprises. It should be a leading feature to accumulate and constantly maintain several years' supply of ore in the reserves, as is done in the Calumet & Hecla mines, and by full and honest reports, prevent those wild fluctuations in the stock which are so disastrous to legitimate mining.

Esq., of Belleville, Mo. The accessibility of the mines, within 24 hours of New York, will enable stockholders at small cost to inform themselves of the actual condition of their property at any time.

taxed under the laws of the State of Missouri. In short, the enterprise possesses the elements of safety, subject to a light tax. profitability, and permanency, conditions which have controlled my own investment in the property.

to show a present value of the entire capital and improvements and are now in possession to start.

fifth of the entire capital and improvements and are now in possession to start.

R. P. ROTHWELL,  
Mining Engineer,  
Editor Engineering and Mining Journal.

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## APPENDIX.

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### OPINIONS OF EXPERTS AS TO THE VALUE OF THIS PROPERTY.

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*Abstract of Report by Professor Ed. J. Chapman, Ph.D.,  
Professor in University College, Toronto, and Consulting  
Mining Engineer, October, 1873.*

Referring to the Gatling Company's lot, Professor Chapman says: This portion of the Company's property has been known to me for some years, and I have already expressed a high opinion of its value. \* \* \* I have made assays of its ores from time to time, and I have never failed to obtain from any sample, as a minimum value, at least fifty dollars per ton. \* \* \* There can be no doubt, therefore, as to the fact that an enormous amount of gold must be locked up within the limits of the property. \* \* \*

This part of Marmora is occupied by a series of gneissoid, syenitic, and other crystalline strata. \* \* They are interstratified in several places with remarkable bands or lodges of auriferous mispickel, associated principally with quartz, but containing also in places small quantities of cubical pyrites, mica, calcite, magnetic iron-oxide, and other substances. In addition to small strings and so-called feeders of ore, four distinct bands of workable dimensions have been traced entirely across the location from north to south. \* \* \* The bands have all the characters of regular veins. \* \* \* The east lode, \* \* \* at a depth of about 60 feet from the surface, exhibited an evidently increasing width of 16 feet. It consists essentially of a quartz gangue, carrying large

quantities of solid and crystallized mispickel, with scales of mica, and here and there some layers of talcose slate, especially along the hanging-wall; and it presents constantly good shows of free gold. The greater part of the gold which it contains is absorbed, however, in the mispickel, and this requires a somewhat more elaborate process than mere amalgamation for its extraction. From the numerous trials that I have made, I do not think that any portion of the pure mispickel contains much less than \$100 worth of gold to the ton, and a great deal more is present in many portions of it. The mixed ore in its crude or undressed state will necessarily show a lower yield, but, as already stated, in fairly chosen samples I have never found less per ton than \$50 worth of gold. The gold is alloyed with a small amount of silver, but the fineness is never reduced by this below 22 carats.

\* \* \* \* The following results were obtained from samples collected very carefully, with a view to obtain the average amount of precious metal held by the undressed ore. They are thus, it must be pointed out, much below the average yield of dressed or picked samples. \* \* \*

Average sample from the Gatling or No. 1 vein, gold, \$73.50  
 average sample from No. 3 vein, gold, \$69.86; average sample from the O'Neil or No. 4 vein, gold, \$60.26. \* \* \*

On a former occasion, I obtained from a small sample of the Gatling ore, which probably contained some undetected specks of free gold, no less than \$112, and from a piece of pure mispickel \$156 per ton. \* \* \*

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*Abstract of Report by Professor W. T. Rickard, F.C.S.,  
 London, Eng. Sept. 14th, 1874.*

\* \* \* \* The four veins on the Gatling Company's property consist of massive opaque white quartz, carrying mispickel in the proportion of about 20 per cent of its weight, with gold visible in portions of it, and which is readily manifested by crushing and panning; calcite is found associated with it in patches, as well as magnetic oxide of

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kel, with scale iron and hematite (doubtless resulting from atmospheric decomposition of the mispickel), as well as small proportions of iron pyrites and copper pyrites.

The first or east vein is about 150 feet westward of the river Moira, and the fourth about 350 feet still farther to the westward; the intervening second and third veins being nearly equidistant, thereby offering great facilities for cross-cutting in depth, and working from the same shaft if considered desirable.

The width of the veins is variable; the minimum may be put down at three feet, and the maximum at eighteen feet. For instance, the large shaft on the east vein shows an average width of twelve feet; No. 3 vein, in the 20-foot shaft (where it shows much visible gold), five feet; and on No. 4 vein, a width of five feet is also found. \* \* \* \* \*

In order to arrive at a practical estimate of the ores exposed by shafts sunk, and by outcrops of the three principal veins, I would calculate, for each vein, an average width of only four feet across the property, which might confidently be relied upon as a working average, and an average of fifty-five feet in depth on each vein. We thus have in sight on each of the three veins 111,100 cubic feet of ore, or for the three veins 333,300 cubic feet, which, reckoned at eight cubic feet per ton *in situ*, gives 41,662½ tons.

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*Abstract of Report of James Douglas, Jr., Esq., Geologist and Mining Engineer, dated November 26th, 1873.*

I was surprised to find in Marmora heavy persistent lodes of quartz highly charged with a congenial gold-bearing mineral. \* \* The Marmora deposits present so many points of resemblance to auriferous lodes of recognized value in the great gold-fields of the world as to incline one's judgment strongly in their favor. \* \* \* \* \* Throughout the properties [now consolidated in the Canada Consolidated Gold Mining Co.] there seem to run three large north and south lodes, and a fourth running from southwest to north-

east, cutting the preceding diagonally. \* \* \* The openings are so many and close, and the quartz outcrops can in many places be detected in the intervals, as to leave little doubt that at least three principal lodes extend from south to north for about 2000 feet. \* \* \* Nowhere do they appear to be less than three feet in thickness, and they regularly produce and character of the ore from top to bottom of the several shafts which have been sunk give promise of permanence in depth. \* \* \* The lodes are of such a size and, to all appearance, so persistent that a large daily output could be regularly relied on. It would not, to all appearance, overtask any of the properties (portions of the consolidated property) to extract fifty tons a day from them, and as shafts could be sunk and levels driven throughout in productive ground, the mines could be cheaply opened up.

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*Extracts from Captain Benjamin Plummer's Report, made to Messrs. John Taylor & Sons, London.*

\* \* \* The property under review (the Hawkeye lot, the Gatling 5 acres, and Tuttle lot) shows very favorably, and I feel myself justified in recommending it on the conditions before named [that the Tuttle lot be added to the Hawkeye and the 5-acre lots]. It carries most extraordinary shows of gold on the backs of the lodes mixed with the gossan and close to day, but this of itself, in a commercial point of view, is of little value. The most important tests made at those from the vein at some depth below the floating gossan as it represents the value of the lode when it gets into the settled state. In securing the samples tried by Prof. Chapman my object was to get as far below the gossan as could. Prof. Chapman's assays of these samples gave respectively in gold \$38.65, \$24.87, \$36.60, and \$24.74; average \$31.21 per ton of 2000 pounds. Mr. Plummer says: "The four samples were taken with a view to test more especially the Hawkeye section."

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*Abstract of Report of Messrs. Francis and Rouse, Mining Experts, made to Messrs. John Taylor & Sons, London, March, 1874. (This report refers to a portion only (less than one half) of the property of the Canada Consolidated Gold Mining Company.)*

This gold-bearing belt contains three (probably four) well-defined fissure-veins in trap-rock with several branches or feeders dropping into them. These lodes are about equidistant from each other, and vary in width on the surface from two to five feet, widening as they go down in some of the pits to as much as eighteen feet at eighty feet in depth. \* \* \* All the lodes have a westerly dip, and wherever they have been opened upon they present shows of free gold and carry a proportion of mispickel equal to from one third to one quarter of their contents.

The lodes are well defined, incased in good walls, widening in depth, and possessing all the characteristics necessary for yielding sufficient quantities of ores to give a large daily output. \* \* \* A large quantity of timber is standing on the property, which will be useful for fuel and mining purposes. \* \* \* In conclusion, we beg to say that the length, width, and extent of the veins, the yields of gold obtained from the surface, the remarkable yields of gold in the mispickel, combined with the comparatively low rate of wages and stores, render this property, in our opinion, very valuable.

*Report, made  
London.*

Hawkeye lot, the probably, and the conditions before Hawkeye and shows of gold gossan and element of view, the tests made at the floating gold it gets into the by Prof. Chas. the gossan as samples gave \$24.74; average says: "The more especial

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*Opinion of John C. F. Randolph, Mining Engineer. In a letter dated October, 1878.*

I visited the Gatling mining property a few years since. I was extremely pleased with it. It carries three strong, wide veins well marked, cutting through the metamorphic rocks. The ore consists of quartz carrying free gold and containing large amounts of mispickel carrying gold. The ore is not an easy one to handle, but it contains a good deal of gold. It is an extremely valuable property.

*Opinion of Adolph Thies, Mining Engineer and Metallurgist,  
June, 1880.*

Mr. Thies acted as Assayer and General Manager of the mines and mills during the time they were being worked by R. P. Rothwell, under an option of purchase; he therefore had the very best opportunity for becoming familiar with all the facts in the case, and his long and varied practical experience in many parts of the world entitles his opinion to great weight.

He says: I have always considered the Gatling and Tuttle property a very valuable one. Having had the opportunity of examining the underground workings, and of making the assays of the ores and of noting the method of concentration, amalgamation, etc., I could from my past experience in gold mining make a comparison of value.

From the developments made on the several parallel veins on the property, no one can doubt their persistence downward. Contractions of the veins occur, but no pinching out. The thickness of the veins is so great there can be no lack of ore—the first essential in a mine—and of such richness as to leave a very handsome margin of profit. My assays on 515 tons of crude unsorted ore gave me an average of \$13.37 in gold per ton, and this will certainly pay well in a country where labor and supplies are as cheap as in Canada.

With the mine opened for stoping, the cost of mining should not exceed \$2 per ton, and for concentration, roasting, and amalgamation or chlorination, should not be more than from \$1.50 to \$2 per ton, so that \$4 per ton at the outside will cover all the cost of mining and treating this ore. The successful roasting of these ores in the revolving cylinder has greatly lessened this item of expense, and the facility with which the roasted ore amalgamates has been fully shown in my work, where I obtained 80 per cent of the assay value. The thorough concentration of the ore by jigs and belts presents no difficulty, and it is in my opinion a very important consideration. So far as my personal knowledge of these Marmora veins, their ores, and the treatment of the same

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goes, I do not hesitate to say that I am convinced you will never regret the purchase of this property.

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*Abstract of Report of Captain Thomas Couch, Mining Expert,  
February, 1880.*

\* \* \* \* Throughout almost the entire length of these combined properties are traceable three strong, persistent lodes, coursing nearly north and south through syenitic granite. \* \* \* The bulk of matter with which these lodes are filled is quartz interspersed with auriferous mispickel, copper pyrite (the latter rarely), and occasionally horses of country rock, which are found here as in all true lodes. \* \* These lodes, like others of their character, will be found to expand and contract alternately, both in their trend and depth. \* \* \* \* The thickness of the lodes is variable. The west lode is three to four feet; the middle lode is three to four feet. The main lode is four to twelve feet wide. \* \* \* \* All the foregoing facts together give evidence of strength and persistence of continuity in length along the respective lodes, and must be regarded as proof of continuity to the deep; for no better or stronger evidence of that fact could be adduced except actual developments.

The gold in the lodes of the combined property is found partly free in quartz, and partly associated with mispickel. The former is easily extracted from the rock, after pulverizing, by panning. This part of the gold is found principally near the surface, at points where the sulphureted ores have been decomposed by atmospheric agencies. But it is by no means confined to this; for a day scarcely passes that gold is not seen by the unaided eye in the ore from all points where work is being prosecuted. Besides, by pulverizing the purest of the mispickel, it can be panned out in variable quantities. The value of the property, however, depends mainly upon the yield of the arsenical pyrites, which are known to contain the greater portion of the gold.

This fact is one of great importance, as it proves beyond peradventure that the lodes do not depreciate in value below the water-line, and can be depended upon to yield to a great depth. It must be remembered that the sulphureted ores are not evenly distributed throughout the entire lode, but will, as is the case in all lodes, be found in spots and chimneys, alternating with comparatively barren zones.

My samples consisted of lots from 1000 to 4000 lbs., taken promiscuously from the several points now being operated, as it is hoisted from the shafts and levels. These ores were first run through a Blake crusher, and as each lot was shoveled to the mill battery every tenth shovelful was thrown aside for a sample. The results, as obtained from these samples, were as follows:

	Gold.	Silver.
1. Tuttle shaft (two tons) . . . . .	\$26 45	0·11 oz.
2. Drifts (deep shaft), (two tons) . . . . .	16 33	0·07 “
3. N shaft (on cross fissure), (one ton) . . . . .	4 96	....
4. Middle lode (one ton) . . . . .	32 65	0·13 oz.
5. N shaft, Hawkeye (one ton) . . . . .	7 85	....
6. S “ “ (one ton) . . . . .	7 44	....

(Assayer, W. E. Gifford, New York.)

#### ORE IN SIGHT.

*Main or East Lode.*—This lode is explored for a distance of over 1000 feet, besides an opening 1100 feet south, which shows a continuous lode for upward of 2000 feet. In the following calculation, I have included the whole of the Gatling Company's 505 feet and 195 feet of the Tuttle claim, making the length 700 feet. In depth I have gone something more than 50 feet below the lowest point of exploration, making a depth of 150 feet. [The shaft is now down 150 feet, or to the limit included in Captain Conch's estimates, and the high-grade ore now produced shows how correct was his opinion.—R. P. R.] The average thickness of this lode, as exposed along its line, is fully 7 feet; but to allow for waste, horses, contractions, etc., that will be encountered in explor-

ation, I have reduced it to 5 feet, which I think a conservative figure. We have therefore 52,500 tons, allowing 10 cubic feet for one ton.

*Middle Lode.*—The thickness of this, in the openings made upon it, is about 4 feet; allowing for contingencies as above, I shall calculate it at 3 feet; length, 200 feet, or about 50 feet on each side of the two shafts; and at a depth of 100 feet, about 50 feet deeper than the explorations. We have then 6000 tons.

*The West Lode.*—O'Neil shaft: I have in my calculation allowed 50 feet on each side of the shaft and 100 feet deep and a thickness of 3 feet, which gives 3000 tons.

*Total ore in sight, 61,500 tons.* \* \* \* \* \*

While it can hardly be considered justice to the property to entirely ignore the unexplored lode (office vein), whose outcrop is traceable for such a length along the surface, and yielding gold at every point that has, thus far, been tested by panning, I do not feel warranted in making a definite estimate upon it, or any lode that is not explored at some point below the surface outcrop. I do not hesitate to say, however, that I am of the firm opinion that this lode will be found to be a source of profit to its owners. Also, while the above quantity of ore may safely be considered as now technically in sight, this is but a small part of the ore which I believe will be developed in sinking the shafts and driving levels as recommended.

*Remarks.*—At the time of my examination, the shafts on this property were nearly full of water, which, together with the snow covering the surface, rendered it impossible to make a complete and satisfactory examination. I am informed by reliable persons that the three shafts sunk on this property are respectively 50, 25, and 25 feet deep, and that the lode is 7 to 15 feet thick.

Judging from the quantity of ore lying around these respective shafts, the inclination and course of the vein, and the similarity of the ore, as compared with that of the other mines,

together with the great power of the veins on the latter, which course directly toward this, I believe these openings to be on the extension of the two lodes opened south of them. Every thing in its surroundings leads to this conclusion, and proves besides the persistence of the lodes.

There is a 20-stamp mill upon the property equipped with every thing necessary for the reduction of the ores. \* \*

\* \* \* \* While I do not think that it will be found difficult to treat these ores satisfactorily, and without much experimental expense, I can not insist too strongly on the necessity of having the ores reduced under the supervision of the most practical and skillful manager that can be found. Upon this the success of all the other enterprises, largely depends. \* \* \*

The natural facilities afforded by this district for mining are not equaled by any other I am familiar with. It is situated in the heart of a timbered country, and traversed by a river that furnishes sufficient water to operate 200 or more stamps at least eight months in a year. \* \* \*

Labor is obtained at from \$1 to \$1.25 per day, cord-wood for \$1 to \$1.25 per cord, and other material correspondingly cheap. \* \* \*

In consequence of the vein-stone being hard, development by sinking shafts and driving levels will be necessarily slow. To facilitate this part of the development, I would recommend the introduction of rock-drills; by the use of these machines, I think the progress of nearly a foot a day can be made in sinking a shaft 10 x 5 feet. All of this work should be done by contract; by adopting this method, and furnishing the contractors with drilling-machines, I think the cost, including all necessary material, will not exceed \$12 to \$15 per foot. A shaft of these dimensions will yield from the main lode 5 tons of ore per foot. \* \* \*

The cost of mining in exploration [given in detail] is something over \$4 per ton. This, it must be borne in mind, is in the actual development in opening reserves, without counting in any stoping. As soon as the mine is opened to

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a sufficient extent to admit of stoping from the roof of the levels upward, the cost to produce one ton of ore will not exceed \$1.25. The average cost of mining, including dead-work, will not exceed \$2.20 per ton. \* \* \* \*

The cost of milling, roasting, amalgamating and hauling, [given in full detail] amounts to \$1.30 per ton.

*Profits.*—The average assay value of the ore from the main vein is \$21.39 per ton. In my calculation upon the reduction of the ore, 20 per cent of the assay value is allowed as loss in the operation. Hence, we have as the net value of one ton from the main vein \$17.11, less the average cost of mining and milling, \$3.50 per ton, leaving net value \$13.61 per ton, on 52,500 tons, equal to.....\$714,500

Middle vein, average assay value of ore \$32.65 per ton, less 20 per cent loss—\$26.12, less cost mining and milling, \$3.50 per ton, gives net value of reserves, 6000 tons @ \$22.62..... 135,600

*O'Neil shaft*—3000 tons in sight, same *net* value after deducting mining, milling, and loss..... 67,900

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Total *net value* of ore in sight.....\$918,000

\* \* \* It is well known that ore in veins is found in chutes, chimneys, and blotches, alternating with poor zones of similar shape. \* \* \* Again, the chimneys of ore are never found to be of the same uniform grade, and where a lode is developed by shafts only, without having extended longitudinal galleries to prove the extent of the rich or barren chute, the surroundings must be carefully considered and the investigator can hardly be too conservative in estimating the value of a mining property.

The Marmora gold mines are no exception to the thousands of mines I have already seen. I have proven to my satisfaction that there are rich and poor chutes in those lodes as in all others. Two shafts on the so-called west lode are in chutes of different quality of ore. The south shafts on the middle lode are in good ore. The north shafts on the Hawk-

eye, nearly 1200 feet distant, which I believe to be on the same lode, are in a chute of low-grade ore, while the three shafts on the east lode are all in good ore, with variations, which proves a chute of great extent. Knowing these changes in the constitution of lodes are inevitable, I have made liberal deductions for them in this as in all other properties; but, taking into consideration all things relating to these lodes, their persistence in length, their width, their geological relation to the old schists and granites, and the true vein quartz gangue, coupled with ore in paying quantities, besides being surrounded with every facility for cheap mining; accessible at all seasons of the year, in a healthy climate, I can not but say that I believe the lodes are of the most permanent character, and will, by the exercise of due care in the reduction of the ores, be a source of continuous profit to their owners. \* \* \* \* \*

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*Abstract of Report by R. H. Stretch, Mining Engineer, dated April, 1880.*

\* \* \* The facilities for conducting mining operations very economically are seldom surpassed. Labor is fairly abundant at rates ranging from \$1. to \$1.50 per diem, the latter only for skilled; the average for a large gang of men need not exceed \$1.25. \* \* \* \* A two-horse team with driver commands about \$2.25 per diem. Good board costs \$2.50 per week. \* \* \* *Firewood* is worth \$1 to \$1.25 a cord. *Pine Lumber* at the mills, about 4 miles from the mines, is worth \$8 per M; in quantity it can be contracted for at \$8.50 delivered. *Timber*.—Mining timbers, partly squared, are said to be worth about 3 to 5 cents per running foot, in sizes ranging from 8 to 12 inches. The country is heavily timbered, so that there need not be any fear of serious changes in these prices for many years to come.

*Supplies*.—Shoes and dies, and similar iron castings, are worth at present about 4 cents per pound. Salt not over \$10,



per ton, or half a cent per pound. Limestone is only nominal, as it is everywhere abundant, and sulphuric acid, manufactured at Brockville, Ont., is worth  $2\frac{1}{2}$  cents per pound in Belleville, in comparatively small quantities.

*Water.*—Water is abundant everywhere. The Moira River, which is now fully 70 feet wide, runs parallel with the veins a few hundred feet to eastward of them and within a thousand feet of the principal openings, has a succession of small rapids and one fall of 25 or 30 feet. \* \* \* By a low dam and a short shallow earth-cut, a first-class mill site can be made just east of the Mormon shaft, which would secure a fall of fully 30 feet, and have an abundant power for all necessary machinery during at least eight months out of the year. During the balance, it is probable that it would have to be supplemented by steam power. \* \* \* (Reference to Map.)

*Five gold-bearing veins* are more or less distinctly proven by outcrops and exploration to exist on the property. They run north and south near its eastern boundary and dip to the west, in which direction the property extends so far that there is no danger of their running beyond its boundary in any possible exploitable depth. \* \* \* \* While the belt can be pretty thoroughly traced for over 3000 feet through the property, that portion which is best known lies on the Gatling Co.'s and Tuttle grounds, and covers an area of about 800 feet north and south by 300 feet east and west.

*East or Main Vein.*—This vein first shows itself distinctly near the south lines of the Tuttle property, as a strong iron-stained quartz outcrop (square E). Two hundred feet to the north, the same quartz again comes to the surface, and, as usual, discolors the ground red (square E 3); one hundred and eighty feet to the north (square T 4) the outcrop is exceedingly strong; but the quartz, though iron-stained in the joints, seems to be barren in the old shaft on the east side of the road. The vein at this point is so flat (about  $15^{\circ}$  to  $20^{\circ}$ ) that to avoid destroying the road, a new shaft, called the Mormon, was sunk to the west. This is now fifteen feet deep, has drained the accumulated

surface water from the old shaft, and appears to have entered the hanging-wall of the vein. The rock is stained pale red, and is a mixture of syenite, mica, quartz, calc-spar, and mispickel, but is not yet thoroughly mineralized. The vein is probably ten feet thick, and its structure will be easily understood by the cross-section on the map.

Two hundred and fifty feet to the north (sq. E F 7) a small pit (D) was sunk to the west of the road in which the quartz (iron-stained) was found to lie very flat, and in small quantity. West of these two last-mentioned developments (sq. E 6), a fallen tree shows considerable quartz among the upturned roots.

\* \* \* \* \*

Fourteen hundred and fifty feet north of the first outcrop mentioned, and near the north line of the Tuttle property (sq. D. 15), we come to the Tuttle shaft, which \* \* \* is now 38 feet deep. \* \* \* The first 30 feet was sunk vertically, about 9 feet square, all in ore. At this depth, the probable foot-wall was struck with a westerly dip of about 60°. A little work was done in this foot-wall to determine the fact, and the rock therefrom is the only waste on the dump. The shaft was then changed to the dip of the vein, and the bottom is still in ore with no sign of a hanging-wall. These facts, as will be seen by reference to the cross-section of the shaft on the map, make the probable width of the vein at this point about 25 feet. Water was struck in the bottom of the shaft, which proved to be connected with that in the "A" shaft, and also with a spring about 60 feet south of the shaft. \* \* \* It has now risen to within about 5 feet of the top (being about 7 feet above the water in the river) and stands at a corresponding level in the "A" shaft. This shaft has produced about 251 tons of ore, or about 6½ tons to each running foot. \* \* \* My sample of one ton from the bottom of the shaft, carefully crushed and sampled, gave me by assay \$19 per ton of 2000 pounds.

One hundred and twenty-five feet north of the Tuttle shaft,

we come to the "A" shaft (sq. D 17). This \* \* \* is now 46 feet deep. \* \* \* The shaft has produced about 119 tons of ore. \* \* \* The shaft has a waste dump of about 60 tons or over. \* \* \* My sample from one ton from the bottom, carefully crushed and sampled, gave me a result of \$18.25 per ton.

For 30 feet west of the shaft, numerous outcrops of quartz can be seen which approach each other rapidly on the south and seem to concentrate at or just north of the Tuttle shaft. The continuity of the east branch of the vein from the "A" to Tuttle shaft is proved by five small cuts (see Map, tier 16) showing kindly iron-stained porous quartz, and the western branch is well shown in the outcrops (untouched). No cut has been run across these stringers to determine their value.

Two hundred and ninety-seven feet north of the "A" shaft, we come to the deep shaft. The intervening ground has not been proved by surface exploration \* \* \* except just south of the fence (D 17), and I had the outcrop again exposed in mineral in the garden (D 18), about midway between the shafts at a depth of two feet. It here showed stringers of good mineral; but I did not expose the main vein, as the surface *débris* over it is fully 10 feet thick.

The deep shaft is the most important development on the property. \* \* \* It was sunk a little over 70 feet some years ago, and has been continued this winter to a depth of 105 feet. The explorations at the 70-foot level extend from the center of the shaft 46 feet to the north and 41 feet to the south. Near the surface, the vein was somewhat mixed, but rapidly opened in ore, until the top and bottom of the incline are 18 feet apart in the widest place, with quartz yet on the upper side. The shaft was then contracted (for economy in sinking) to a height of ten feet at the level of the drifts, and again to seven feet below the same. At the bottom, 105 feet down, the apparent foot-wall has flattened and reduced the thickness of the ore-seam, which is now nearly pure mispickel, to less than two feet in thickness. It has been smaller, but shows signs of again increasing in size. [At the present depth of 150 feet,

it is fully six feet wide, of excellent ore.—R. P. R.] The drifts are run  $6\frac{1}{2}$  feet wide, entirely in ore and quartz, with no sign of walls, unless it be in the end of the south drift on the west side. \* \* \* \* \*

My samples of ore, one ton each, taken from the following places, crushed and carefully sampled, gave me the following results per ton: End of north drift, \$8; and of south drift, \$7; bottom of shaft, \$21.50.

Seventy-three feet north of the deep shaft, we come to the water-shaft. This is said to be 45 feet deep, but is full of water to within 5 feet of the top. \* \* \* For 240 feet north of the water-shaft, the vein is disclosed in 7 pits, of which No. 6 was the discovery-shaft. No. 7 (in D 21) is said to be 15 feet deep, shows good ore at the surface and a good hanging-wall, but is nearly full of water. \* \* \* The pits from 8 to 12 show a very strong quartz vein, not so thoroughly mineralized as in No. 6, but carrying a good deal of gold in the associated earthy matter. Pit No. 12 is over 2200 feet from the cropping at the south line of the Tuttle property. Beyond this point, the vein is not traceable, unless it be faulted and the outcrop seen under the roots of a fallen tree 50 feet west (sq. D 23) be the same thing, which is more than probable. The outcrop at this point is strong, but does not seem to be mineralized.

Two hundred and sixty feet north, with faint intermediate indications becoming stronger northerly, we come to the South Hawkeye Shaft (D 26), which is about 25 feet deep and dips strongly to the west, with a heavy body of quartz. The dumps are large, and I judge that nothing has been hauled away. In the bottom of the shaft, the foot-wall flattened and cut out all the quartz except about two feet, which seems to be again increasing in size and carries quartz, calc-spar, red hematite iron, iron pyrites, and but little arsenical pyrites or mispickel. With the exception of a few small pits, the reddish discoloration of the earth, and some little quartz at the intersection of the road (C 29), nothing is seen of the vein until it again crops very boldly in the low land 580 feet north of the

South Hawkeye. The quartz here is very solid, but does not appear to be heavily mineralized at the surface. Explorations were first commenced at the time of my last visit. This point is 3100 feet north of the first outcrop near the Tuttle south line, and the vein may be considered traced for that distance.

*Office Vein.*—West of the main vein and at a distance varying from 50 to 60 feet therefrom, is a strong and continuous line of outcrops which have not been prospected, except by a small cut which I ran opposite the deep shaft, and in which I found considerable quartz and streaks of good mineral. They extend from opposite the Tuttle shaft to opposite shaft 7, a distance of 600 feet. \* : \* \* They are strongest to the south, but carry less mineral. Toward the north, good streaks of ore occur in the grass-roots.

*Powder-House Vein.*—Along the Powder-House ridge, west of the office, and about 50 feet from the office vein, is a double line of small outcrops known by the above name, which extend from the "A" to the deep shaft, a distance of 300 feet, but do not seem to have much practical value, as they lie in a belt of hard pink syenite. A few small holes have been sunk upon these outcrops, but not enough to determine their value.

*Middle Vein.*—About 60 feet west of the Powder-House vein, we come to the middle vein, which lies about 180 or 200 feet west of the last or main vein. While the croppings are plainly exposed as barren quartz on the knoll west of the office (sq. B 16), and again on the west side of the Powder-House Ridge (D 18), the two shafts are sunk nearly opposite the deep and water shafts (D 20), with a few small pits (D 21) still farther north and near the line of fault, which seems to cross the mineral belt from southwest to northeast about 100 feet north of the north shaft on this vein (see Map). \* \* \* The shafts are said to be 18 and 30 feet deep. From the size of the dumps, I should take the north shaft to be the deepest. The size of the vein is difficult to determine, as it is not visible, but it must have had a fair strength, judging from the size of the quartz dumps and the size of some of the masses of ore

lying thereon. One of these is fully two feet thick. I prospected both of these dumps by washing in the pan without crushing, and found a good showing of free gold, and also found many fragments of ore showing free gold both in the solid pyrites and clean quartz. This result is confirmed by the trial of five-ton lots taken from the dumps which by careful sampling gave a result of \$14.70 and \$39.20 per ton. \* \* \* There must be still left on the dumps of these two shafts fully 55 tons, which, with the 24 tons above spoken of, would give a total of about 79 tons. This for 48 feet of shaft (which was probably a greater depth than was really obtained, as I find all the old depths overestimated) would be nearly three tons per foot of shaft, and indicate a width of about 3 feet for the vein.

The explorations disclose the existence of the vein for a distance of about 500 feet. \* \* \*

*West Vein.*—One hundred feet west of the middle vein or 300 feet west of the east vein, we come to the west vein. This has been opened \* \* \* by the O'Neil shaft, which was sunk to a depth of 46 feet between two good walls, dipping about 60 degrees west, and said to be about three and one half feet apart. Adding the ore on the dump to that shipped, I make the width of the vein about the same. The ore here was of good grade showing free gold as in the middle vein, but the bottom of the shaft is filled with slaty material carrying but little quartz. Several pits show the continuity of the vein 150 feet to the south. Crossing a swampy bottom, a second shaft is sunk 400 feet to the north, in which a depth of 40 feet was attained (A 20). In this shaft a fault was disclosed. \* \* \* Two other openings are made on the same vein, one 670 feet north of the C shaft, and the other still 470 feet beyond (sq. A 31). The latter is just west of the northernmost outcrop of the east vein and about 200 feet to the west. The first of the shafts (A 27) is but little more than a large prospect-hole, but shows the vein in quartz. The second shaft, marked Hawkeye shaft, is about 35 feet deep, with a strong westerly dip, the foot-wall flattening rapidly and cut-

ting out the ore. The dumps both of waste and quartz are large, but no careful test of the ore as yet has been made in quantity. The ore is characterized by the presence of but few large crystals of mispickel, this mineral occurring chiefly as a fine-grained steely amorphous mass or in compact stringers.

*Structure and Character of the Vein.*— \* \* \* From all the facts collected, it would be more correct to describe this group of mines as a mineralized belt than a series of true fissure-veins. In none of the shafts, if we except the O'Neil shaft, is there any evidence of the smooth boundary-walls with clay seams and polished faces, although there is an abundant evidence of great motion in the fissures.

\* \* \* \* The extent of the veins north and south, as seen on the property (3100 feet), and their recurrence again at other points both north and south, leave but little if any doubt of their permanence in depth. In width the ore is variable. In no case, if we except the west and middle veins, has its true width been determined. No hanging-wall has been found in the deep or Tuttle shafts, and it is questionable whether the same is not the case in the A shaft, yet we know the quartz to be 18 feet thick in some portions of the deep shaft, and 10 feet thick in the Tuttle shaft, while the probabilities, as shown in the sketches of these shafts on Map 1, are that it will prove to be 20 feet thick or over in both cases. In the west or middle veins, the thickness is probably from three to four feet.

*Character of the Ores.*—The ores consist chiefly of a quartz gangue, more or less mixed with varying quantities of calc-spar, the whole mass being occasionally mixed with masses and fragments of talcose slaty matter. The associated minerals are mispickel or arsenical pyrites of iron in large quantities, carrying gold both free and in combinations, with occasional patches of iron and copper pyrites, red hematite, and mica. The gold is sometimes visible. \* \* \* The mineral also penetrates the slaty fragments, and the presence of these does not impoverish the ore, but seems, as

in many other mining districts, if any thing, to improve its quality.

*Quantity of Ore.*— \* \* \* \* The amount which has been mined \* \* \* \* amounts to 1708 tons, of which 1000 tons are still on the dumps. \* \* \* \* \*

I estimate the amount of ore in sight as follows :

	*	*	*	*	*
"A" to Tuttle Shaft.....	145	x	40	x	10 feet = 58,500 cubic feet, or 5,850 tons.
Deep to Water Shaft.....	106	x	105	feet deep, x	12 = 131,400 " " 13,140 "
Croppings East Vein.....	120	x	10	feet	x 5 = 6,000 " " 600 "
Middle Vein.....	100	x	24	feet deep, x	3 = 7,200 " " 720 "
"C" Shaft.....	20	x	40	"	x 2 = 1,600 " " 160 "
O'Neil Shaft.....	50	x	40	feet	x 3½ = 7,000 " " 700 "
Total tons in sight.....					21,470

This estimate is based on ten cubic feet to one ton, which is the extreme allowance. If calculated at twelve cubic feet to one ton, the result would be 17,891 tons.

The developments made render it *probable*, however, that more or less ore will be found between the present explorations in the "A" and deep shafts and in the ground below the "A" and Tuttle shafts. This quantity I should estimate as follows as an extreme limit :

"A" to deep shaft, 240 x 100, with an allowance of one half for barren ground ½ <sup>2</sup> .....	12,000 tons.
Below "A" and Tuttle shafts, 150 x 60 x ½ <sup>0</sup> , with the same allowance for waste.....	4,500 tons.
	16,500 tons.

\* \* \* \* Probable ore-yield from the three veins (principal) on the Gatling property for 505 feet in length and 100 feet deep, I estimate in this report 82,750 tons. \* \* \*

The pure gold in the average ore would be about \$13.06 per ton, with some silver, the latter being lost in the chlorinating process. \* \* \*

Total cost of mining, milling, etc., per ton [given in full detail], is a shade over \$3 per ton, and prices of labor are all estimated high ; an allowance of \$3.25 per ton seems ample.



*Net value of Ore per Ton.*—As we arrived at an average value of \$13.06 per ton for the ore, and allow ten per cent wastage in treatment by chlorination (\$1.30), the net value of the ore per ton would be \$13.06, less \$1.30, less \$3.25, or \$8.50 per ton. This would make the net value of the reserves or ore in sight 21,470 tons, at \$8.50, or \$182,495, if estimated at ten cubic feet to one ton. \* \* \* The net value of mining probabilities to a depth of say 100 feet on the east vein (by a length of about 375 feet), say 16,500 tons, at \$8.50 per ton, or \$140,250. \* \* \*

With every thing complete, I estimate the monthly net income from 100 tons daily, at \$8.50 per ton, to be \$25,500; or, to make allowance for all contingencies, say \$20,000.

\* \* \* The presence of so large a number of men would almost necessarily result in the erection of quite a village, and by the opening of a judiciously managed store, the company might add considerably to its income, and, if awake to its interests, could concentrate the trade of a large district.

\* \* \* \* \*

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*Opinion of Mr. N. B. Walker.*

The following extract from a private letter written by Mr. N. B. Walker, of this city, is given as expressing the opinion of a careful, conservative, and clear-sighted business man, who has had much experience in visiting and investigating mining enterprises in all parts of the West; though with all this, Mr. Walker does not profess to be a mining expert or engineer:

DEAR SIR: Your telegram was received at Toronto on the 1st inst., suggesting my visiting the Canada Consolidated Mines. I prevailed on Francis to accompany me. We were fortunate in learning at Belleville that Rothwell was still about, and obliged to remain over till after the 7th inst. Francis left us on Saturday for Montreal, but before doing so

went with me over the property, and into the deep shaft to the bottom, and through the 70-foot levels. Since he left, I have been over the property, and examined the various exploring pits with Rothwell, Gen. Tuttle, and Capt. O'Neil, respectively, and feel quite familiar with the ground, and capable of forming an opinion for myself, or at any rate of drawing comparisons between it and other properties which I have examined in several mining sections in the West. The local conditions are superior to any I have ever seen, as I can think of *no natural advantages*, desirable in a mining camp, that are here wanting. The Moira River, with its inexhaustible supply of pure water, is of inestimable value and capable of furnishing all the motive power that will ever be required to run any machinery you will need, for nine months of the year, on the property. As fine cord-wood as I ever saw, Capt. O'Neil told me he bought just as I saw it on the pile for \$1.25 per cord at the mill, and I saw plenty of the same kind of wood growing on the property of the Company.

"Wood and water" are two primary objects, the first thing that I ask for as local conditions in a mining region; without these I want nothing to do with a mine. Our first lessons, you know, are the most lasting and impressive; my first experience was in Arizona, then in Nevada. I have paid 50 cents for water for myself and mule in Arizona, there being none within 12 miles that my mule would drink; and had the Mexican demanded \$5, I should have been obliged to pay it.

Relative to the mines, I have no hesitation in stating that I think the property very valuable and capitalized at a very low figure. I have never seen better surface indications, and wherever work has been done the veins have been found remarkable, regular in their course, and the ore of uniform character. From the water shaft to the spring beyond the Tuttle shaft on the east vein, I feel quite confident there is a "miner's certainty" (a word coined by Louis Janin) of 700 feet in length, 200 feet in depth, and 5 feet wide; this

alone would yield 70,000 tons; at a net profit of only \$5 per ton would give \$360,000.

While the amount of work that has been done on the "middle" and "west" veins is less extensive than that which has been done on the "east" vein, yet it has been sufficient to justify the expenditure of any reasonable amount of capital to thoroughly open them, and would, in my opinion, be regarded in the West as worth all you ask for the entire property. The fact that these veins can be explored from the 200-foot level of the "east" vein by drifting some 150 feet toward the west, at a very trifling expense, is a matter of very great importance.

The thorough and exhaustive manner in which the property has been explored, and the ore tested by working process, leaves in my mind no room for a doubt that the property offers superior inducements as a legitimate investment, unequaled by any gold mining company I have ever had brought to my notice.

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*Extract from a Letter by Mr. Armitage Rhodes, Mining Engineer,  
Quebec, dated December 4th, 1880.*

Mr. Rhodes has had much practical experience in mining, and during the past year has had charge of the Victoria lead mine at Saulte Ste. Marie, Ont. A large number of shares of the stock have been taken by himself and friends.

I visited the mines of the Canada Consolidated Gold Mining Company last month, in order to see for myself if the mines were as represented. It is needless for me to enter into any particulars after so many reports have been brought before the public by experts of such high authority. Suffice it to say, that the ore in sight far exceeded my anticipations, both in quantity and quality. The situation of the mines and dip of the various veins are all most favorable to inexpensive mining.

The deepest shaft was about 150 feet, in which a gang of men were working at the time. The ore appears to improve in quality as they go down. I found quite a show of free gold

in different places, and ore in abundance everywhere. Therefore, on my return home, I did not hesitate about purchasing stock for myself, besides giving a favorable reply to the many inquiries I had from parties proposing to invest. I consider it as safe an enterprise as it is possible for any mine to be.

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*Extract from a Private Letter by Mr. Adolf Thies, dated November 29th, 1880.*

Mr. Thies spent three months on the property, in charge of the assaying and milling of the ores, from February to May, 1880, and is therefore thoroughly familiar with the intrinsic value of the property and the facility with which the ore is treated.

I am very glad indeed to see from the *Engineering and Mining Journal* that the stock is taken so rapidly, though I do not wonder at this at all, because you have offered it so far below its value. I was highly pleased with Mr. Rothwell's report, and any one who has read the same and is still an unbeliever, may take a trip to the mines and satisfy himself; and he will have to add a good deal more to the value of them than Mr. Rothwell's estimate.

There is no mining enterprise on this continent which offers surer returns than the Canada Consolidated Gold Mining Company.

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*Report by Walter Shanly, Civil Engineer, Montreal, Quebec.*

MONTREAL, January 17, 1881.

RICHARD P. ROTHWELL, Esq., *Mining Engineer, New York:*

DEAR SIR: I have pleasure in conveying to you my impressions of the Marmora Gold Mines, forming the property of the Canada Consolidated Gold Mining Company, as gathered from my visit to, and examination of, the ground and workings last month.

The situation of the property in affording every possible facility for cheap working is probably not to be equaled by that of any important gold mine on this continent.

Most of the great mines are to be looked for in regions difficult of access, where labor has to be imported and highly paid for ; where even the simplest necessaries of life have to be brought from afar, and at great expense ; where fuel is commonly a scarce and precious article, and where even water has to be paid for by the inch.

The Marmora mines lie in the midst of a highly productive wheat-growing and cattle-raising country, where provisions and all the other requisites of "living" are as abundant as, and cheaper than, in New England or New York. The County of Hastings, of which the Township of Marmora is a subdivision, is intersected by macadamized highways and railways. One of the former extends from the city of Belleville, on Lake Ontario, to the mine, and there is a railway station within ten miles.

In respect of geographical position, measured by time, relatively to the great business centers of Canada and the adjoining States, Marmora, lying 33 miles back from Belleville, is distant from—

Toronto, about 10 hours ;

Montreal, about 14 hours ;

New York or Boston, 30 hours.

Fuel-wood of the choicest description can be bought at the mine for \$1.25 per cord of 128 cubic feet, while the River Moira, passing through the property, affords abundant supply of water for all ordinary mining uses in all seasons, and (with 30 feet fall) ample power for driving machinery for nine months in the year.

The great Homestake Mining Company (gold), in the "Black Hills" country, publishes the following statement for the two years and nine months ending with August, 1880 :

Total tons of ore crushed, 278,283.

Net bullion extracted, \$1,889,283.98.

Total working expenses, \$959,825.98.

The cost of plant, stamp-mills, etc., was \$455,210.10.

And dividends paid in same two years and nine months, \$600,000.

This great result was obtained from ore yielding, net, only about \$6 $\frac{80}{100}$  per ton.

The working expenses per ton of rock, averaged \$3 $\frac{46}{100}$ .

Comparing prices for labor and "supplies" of all kinds at the Homestake mine with what we know will be ruling rates in Marmora, and allowing for any probable increase over present rates, the relative cost of extracting the bullion in the two localities, supposing the ores to be identical in character, would be as follows:

	Homestake.	Marmora.
Labor of mining and milling, per ton. . . .	\$1 40	\$0 70
Shafts and dead-work. . . . .	36	20
Machine and blacksmith shops and all else. . . . .	71	47
Fuel. . . . .	28	10
Water. . . . .	11	....
All other "supplies" . . . . .	60	50
	<hr/>	<hr/>
Whole cost, per ton, of rock. . . . .	\$3 46	\$1 97
	<hr/>	<hr/>

And this comparison, so widely in favor of Marmora "facilities," does not take into account the large saving to be effected there by the use of water-power for the greater part of the year as against steam-power, with wood at \$4.75 per cord all the year round at the Homestake mine.

The Homestake ore yields, net, as stated above, \$6 $\frac{80}{100}$  per ton.

The average of 108 assays, from 108 five-ton samples of Marmora rock, shows \$13.37.

These tests, chiefly from your own sampling and assays, must be taken as having been very *safely* made; for I find reports from nine other well-known mineralogists giving far higher results. The average of all the tests made seems to leave no room to doubt that the per ton value of the ore is fully \$18 $\frac{65}{100}$ .

As an offset to the high prices of labor and supplies in the Black Hills region, the Homestake ore is admitted to be "soft and friable, breaking into small pieces after being shattered by blasting, and is readily crushed in the mill. It is in the highest degree a free-milling ore, and is readily amalgamated, the gold it contains being mostly coarse and easily saved in the batteries."

These are large advantages, and did the Marmora rock possess them in equal degree, the value of the property would be almost incalculable. None of the veins as yet exposed, however, mine as easily or will "mill" as freely as the "Homestake" ores. On the contrary, they are roasting ores, and the cost of treatment is consequently much increased.

The counterbalancing advantages of Marmora are to be sought for in the greater richness of the ore, almost three to one, and in the immensely greater working facilities in respect of labor, materials, and water-power, and I confidently predict that the "counterbalancing" will prove so entire and complete as to place the Marmora in the front rank of paying gold mines.

But a small part. comparative

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Machine and blacksmith shops and all else.	71	47
Fuel.....	28	10
Water.....	11	....
All other "supplies".....	60	50
— Whole cost, per ton, of rock.....	\$3 46	\$1 97

As, however, the Marmora ore requires to be roasted and chlorinated, the cost will be increased; although, since only the concentrates, or say one ton in three, will be roasted, and only one ton in four will be chlorinated, the total cost of mining, milling, etc., reduced to the ton of ore as extracted from the mine, will still not exceed from \$3 to \$3.50 per ton, or not more than at the famous Homestake, whose ore yields only \$6.80 per ton, and where fuel is \$4.75 per cord.

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But a small part, comparatively, of the Canada Consolidated Gold Mining Company's property has as yet been "proved;" but your estimate of the value of the "ore in sight" appears to me to be not overstated at \$575,000; and with proper application of capital and skill, the enterprise can not fail of proving a notable success.

W. SHANLY.



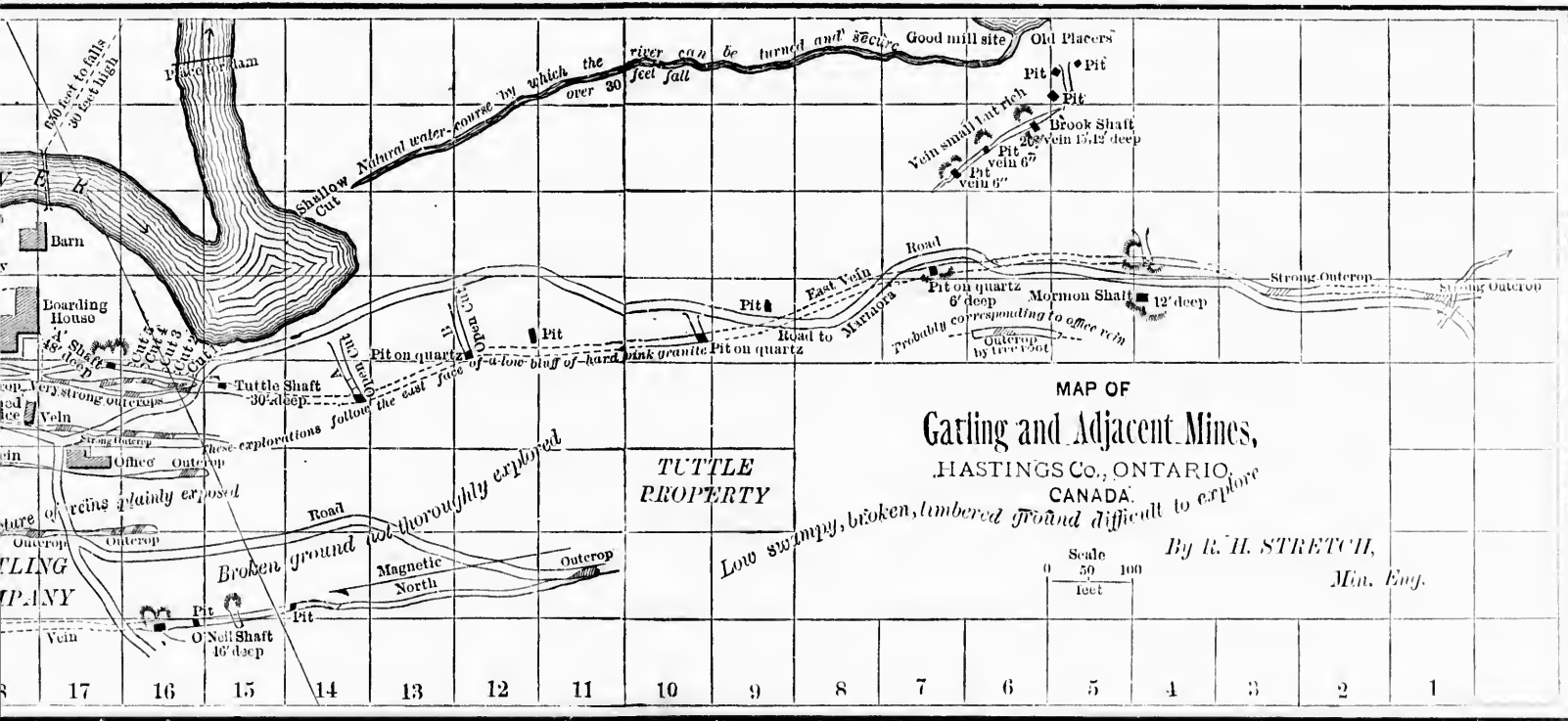




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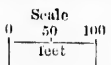




TUTTLE  
PROPERTY

MAP OF  
Carling and Adjacent Mines,  
HASTINGS Co., ONTARIO,  
CANADA.

By R. H. STRETCH,  
Min. Eng.



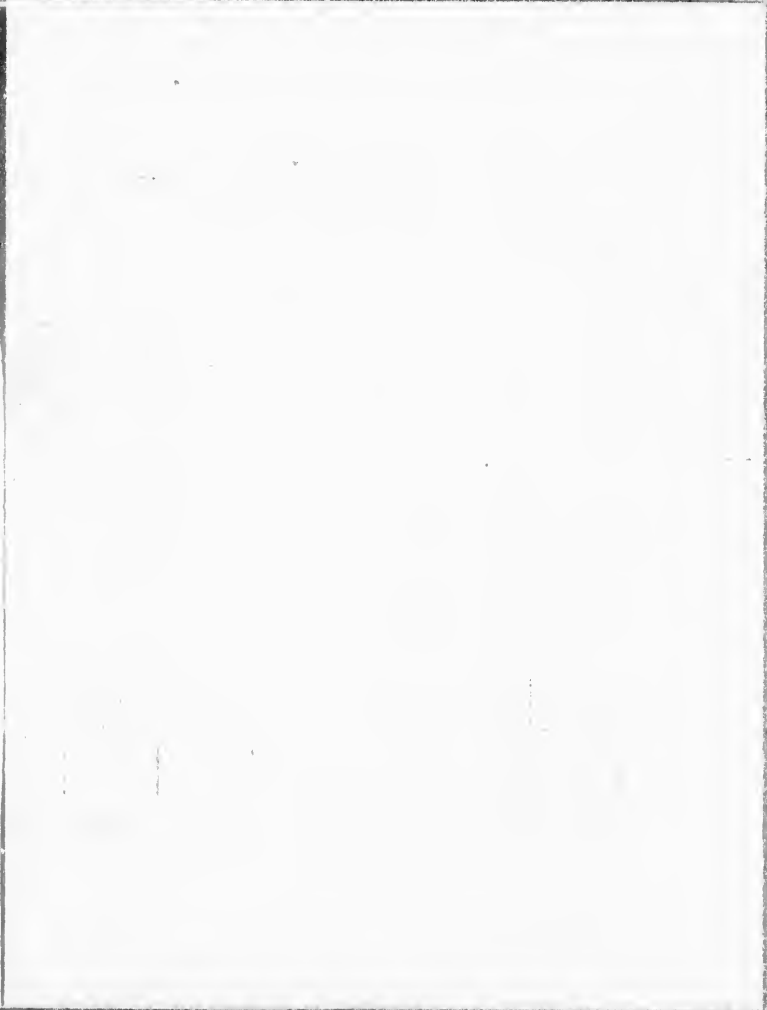
CARLING  
MINE  
COMPANY

17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1





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