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REPORT

BY

ALFRED R. C. SELWYN,

UPON THE

ACADIA IRON ORE DEPOSITS

OF

LONDONDERRY, COLCHESTER COUNTY, N. S.

The following observations on the above deposits are the result of an examination of them which I made in June last, extending over a period of eight days.

My attention was directed chiefly to ascertaining the character of the ore deposits, more especially as regards the quantity which they might reasonably be expected to yield if fully opened out; and whether they could then be made to supply permanently the requirements of a large annual manufacture of iron.

The land on which the ores are found is situated in the township of Londonderry, on the southern slope of the Cobequid Hills. These are described by Dr. Dawson (Acadian Geology, page 579) as follows: "The Cobequid range, attaining at several points a height of 1200 feet, is the highest chain of hills in Nova Scotia; and forms in its whole length the watershed dividing the streams flowing into Northumberland Strait and Chiegnecto Bay from those flowing into Cobequid Bay and Mines Basin and Channel."

Description of
Cobequid Hills.

The property of the Acadia Charcoal-Iron Company extends nearly twelve miles in an east and west direction on the ore vein, with an average width of about four miles, and comprises 33,000 acres in contiguous lots, some of them cleared and cultivated, but the greater part covered with a fine forest of valuable hardwood timber. On the west it is bounded by the Port-à-pique River, and on the east by the De Bert River.

Extent of the
Charcoal Iron
Co's. property.

Twelve other streams and brooks, several of them large enough to be valuable as water-powers, traverse the property in a direction nearly north and south. A series of more or less parallel ridges or spurs from the main axis of the Cobequid Hills separates the streams, and slopes down to them on either side, often very abruptly, from elevations of one hundred to three hundred feet, forming steep valleys and ravines.

Valuable
streams for
water-power.

The rocks, which are often well exposed in these valleys and ravines and in places also on the hills, consist of grey, blue and olive slaty shales, alternating with bands of quartzite, and of hard grey and brown feldspathic sandstones, and have a general nearly east and west strike with a high southerly dip.

Character of
rocks.

For convenience in describing it, the property may be divided into two sections, being respectively those portions which lie to the east and to the west of the present smelting works on Great Village River.

Division of pro-
perty into two
sections.

Names of
streams.

The streams in the western section are Maddison's Brook, Cumberland Brook, Martin's Brook, Cook's Brook, and the east and west branches of Great Village River. In the eastern section there are Campbell's Brook, Mill Brook, Folly River, east branch of Folly River, Pine Brook and Totten's Brook. The water of all these streams and likewise that of the Port-à-pique and De Bert Rivers, empties into Cobequid Bay, the shore of which is distant about five miles from the southern boundary of the property.

Railway com-
munication.

The section of the Intercolonial Railroad between Amherst and Truro passes for several miles through the eastern portion of the property, and a branch railroad three and a half miles in length is in course of construction from the main line to the site of the smelting works at the Forks of Great Village River. When this is completed, the mine and works will be placed in direct and easy communication with the important coal-fields of Pictou on the one side, and of Springhill on the other, and also with the ports of Halifax, Pictou, Truro and Amherst.

Condition of
workings in
eastern section.

On the eastern section of the property no mining operations are at present in progress, and I could therefore only examine the old surface explorations, which are indicated by a number of shallow pits and trenches on the course of the ore. None of these, at the time of my visit, were in such a condition as to afford the means of examining the vein in them, and therefore its presence and dimensions at these points could only be inferred from the character and the quantity of ore which has been raised from the various openings and is now piled on the banks, and from the testimony of the persons under whose superintendence the

Course and con-
tinuity of vein.

explorations were conducted. The general course of the fissure or vein in which the ore occurs is W. 8-10° N. and E. 8-10° S. magnetic. It has a steep southerly dip of about 80°, and in its *strike* or level course it closely coincides with that of the metamorphic slaty shales and sandstones of Upper Silurian age, which form the *country* or wall rocks; and while there is every reason for believing that the fissure or vein is continuous through the entire east and west length of the property, it would nevertheless be premature to assert that it is throughout this distance accompanied by ore deposits. In both the eastern and western sections, there are considerable intervals, especially in the former, in which no ore has yet been found; perhaps only because it does not appear at the surface, through being concealed either by the superficial accumulation of soil, or by carboniferous strata; which, immediately to the east of Folly River, appear to overlap the line of strike of the ore vein. The longest interval in which, so far as I could learn, no ore has yet been found, extends from the west branch of Great Village River to the west bank of Campbell's Brook, a distance on the course of the vein of about 2 miles, (2 miles and 32 chains from subsequent measurement.)

Great Village
River.

The east branch of Great Village River flows through a deep narrow

gorge or *canon*, in which the rock are well exposed. This gorge crosses the course of the vein nearly at right angles, but no ore or any other distinct traces of the vein have been found either in it, or on the high grounds between the east and west branches of Great Village River. A fault or ^{Fault.} break in the stratification crosses the gorge, however, exactly where the vein ought to appear, and it is not improbable that the downward prolongation of this fault might lead to ore deposits. Proceeding eastward, the ground on the strike of the vein is much encumbered with drift; no ^{Ground covered by drift.} ore croppings have yet been discovered, and so far as I could learn, no explorations by sinking or boring have been made between the east branch of Great Village River, and the west bank of Campbell's Brook. Here, however, at a point 450 yards north of the Base-line Road, a level stated ^{Levels reached the vein.} to be 200 feet in length has been driven in search of the vein; and 136 yards further north, and about fifty or sixty feet above the first, is a second level, the length of which I could not ascertain. According to information received, the vein was reached in both these levels, and good ore taken out. Neither of them was accessible for examination at the time of my visit, and I could get no information about the thickness of the vein. On the "spoil-heap" at the mouth of the upper level, there were a few large and small fragments of fibrous brown hematite.

From the Campbell's Brook levels to the elevated ground east of Folly ^{Interval in which no ore has been found} River, is another interval in which no ore has been found, though some traces of ore are said to have been observed about mid-way near where the strike of the vein would intersect the line of the Intercolonial Railroad.

East of Folly River, the first exposure of ore is met with at ^{Ross' Farm.} Ross' Farm. Here a trench, now partly filled in, has been dug on the course of the vein (W 10° N.) 25 yards in length and apparently some ten or fifteen feet in depth, from which a considerable quantity of ochrey red ore has been raised, and used for the manufacture of paint. The workings have however, been abandoned and no ore raised for seven or eight years. One hundred yards further east, in which distance there appears to have been a number of small excavations, the vein has been opened upon for twenty-five yards in length to a depth of about 20 feet. Owing to the sides of this opening having fallen in, the vein was not exposed at the time of my visit. But it is stated to have a vertical position, with a width of eighteen feet at the west end and fifteen feet at the east end of the excavation. About six hundred tons of limonite, in large and small concretionary masses, have been raised here and are now piled on the bank. This work was done in 1864, since when no further explorations have been made and no ore raised.

The ore is of the best quality, and there is no doubt that the vein is very ^{Quantity of ore} largely developed in this part of the property. At the next exposure to the east a shaft has been sunk and large masses of ankerite and specular

ore with some limonite have been taken from it. The shaft having fallen in, I could not examine it, nor could I learn the depth to which it had penetrated the ore.

Eastward
extension of
vein.

From this shaft the extension of the vein eastward can be traced by surface indications to the end of the slope towards the valley of Pine Brook immediately in rear of David Slack's house and 430 yards north of the Base-Line Road, giving it a total length between Ross' Farm and Pine Brook of nearly one mile, with but few, if any interruptions.

Quantity of ore.

Supposing it to average four feet in width for this distance, to a depth of only one hundred feet it might be expected to yield nearly 200,000 tons of ore, allowing ten cubic feet of ore to the ton of 2,000 lbs.

The vein has not been traced across the valley of Pine Brook.

Barn-hill lot.

Further eastward, however, on the Barn-hill lot, it again crops out and is stated to show ankerite with sphatose ore in large quantities.

Peter Totten
lot.

About three-quarters of a mile east of the Barn-hill lot, is the Peter Totten lot; here on the north side of a small swampy brook, a tributary of Totten's Brook, the vein has again been discovered and traced eastward for a quarter of a mile along the slope of the hill, in which an excavation has been made about fifteen feet deep, and twenty-five to thirty feet long and about 200 tons of ore have been raised from it. Dr. B. J. Harrington has made an assay of a specimen of this ore which I took from the heap and which appeared to me fairly to represent the whole, with the following result.

Analysis.

The iron was determined and calculated as hydrated peroxide.

Hydrated peroxide of iron	78.52
Carbonate of lime	20.61
Carbonate of magnesia	0.87
	<hr/> 100.00

Equal Metallic Iron 47.05 per cent.

It may therefore be considered a first class ore. The vein is stated to have a width here of eighteen feet, and as it is very favorably situated for being worked, large quantities of ore could be mined on this lot. Beyond the Peter Totten lot, the vein is said to have been traced eastward for about two miles, by fragments of ore scattered on the surface, but my examination did not extend further in that direction.

Division of
western section
of vein into four
parts.

In the western section, I examined as far as possible, all the openings which have been made upon the vein. This part of the property may be divided into four parts, on each of which more or less ore has been discovered, and the relation of which to each other is shewn on the accompanying plan:

1. From Great Village River to Cook's Brook.
2. From Cook's Brook to Martin's Brook
3. From Martin's Brook to Cumberland Brook.
4. From Cumberland Brook westward to the boundary of the property.

The original workings, which were commenced in 1849, are situated in the first of these divisions; and for eight years they supplied all the ore which was smelted, amounting to 4,000 tons, yielding 1,000 tons of iron. ^{Original workings in Division 1.} None of these old workings are now accessible, having been abandoned since 1857. There appear to have been several levels driven into the hill, which rises abruptly for more than three hundred feet above the river bed, and on the summit a number of shafts have been sunk, the deepest of which is stated to have been seventy feet. The form of the ground here presents the greatest facilities for working the vein, and its proximity to the smelting works should also recommend it in preference to more distant localities; but the only work at present going on in this division is the raising of ankerite for use as a flux in the furnace. It can be quarried in the steep face of the hill fronting the works, (see plan) and delivered at the furnace for \$1.10 per ton, the quantity available being practically inexhaustible. ^{Cost of ore at the furnace.} I could obtain no very satisfactory explanation why the mining operations in this locality were suspended, but on comparing the return given above of the produce up to 1857, with that which has since been obtained from ores which are carted to the furnace from a distance of two and a half to three miles at a cost of sixty cents per ton, it is seen that the ore which was mined at Great Village River works, was of a much lower percentage than that which is now used, or else that the smelting process then in use was very defective. From 1857 to 1861 the production of iron is stated to have been 4,000 tons from 9,000 tons of ore, and the same proportion has been maintained up to the present time, from a total of 60,000 tons of ore. ^{Production of iron.}

The character and appearance of this part of the vein as observed by Dr. Dawson, when active operations on it were in progress, is fully described in his "Acadian Geology, (pages 583 to 586). It appears to have been traced by surface openings for about 880 yards, which carries it to within one hundred and eighty yards of Cook's Brook.

In the second of the foregoing divisions, a distance of about 1,150 yards, ^{Division 2.} the only openings on the vein are one level and a few apparently shallow pits. These openings are close on the west bank of Cook's Brook, and directly on the course of the vein from Great Village River. In the level, which like all the other excavations described, was not accessible, the vein is stated to have been struck at fifty yards from the mouth, and of the level was then driven a further distance of three hundred feet on the course of the vein, which showed an average thickness of three or four feet. The ore here was chiefly specular iron, mixed with red ochrey ore and ankerite. ^{Specular ore.} There are now about fifteen tons of ore piled at the mouth of this level, but none has been taken to the furnace. The crop of the vein has not been traced over the hill westward from these workings to Martin's Brook, but there is good reason for believing that it will be found to be

continuous in this direction. A thorough exploration of the intervening ground would be desirable. I could not learn that any ore had been found in Martin's Brook or that any excavations had been made there. Dr. Dawson informs me, however, that he found some thin veins of specular iron ore near to where the vein might be expected to shew itself in the bed of the brook. Proceeding westward, the next exposure of the vein occurs on the hill side, at about 350 yards to the south-west from the point in Martin's Brook above named. Here the vein was found to run nearly north and south, (see plan) and to underlie about 80° to the westward. It continued on the same course for about one hundred and eighty yards, when it gradually resumed its normal course of west 10° - 13° north, on which it has been traced and more or less worked upon, to within one hundred and fifty yards of the Cumberland Road, a distance of about fifteen hundred yards.

The most extensive workings on the property are on this part of the vein, and from them the whole of the supply of ore for the past fifteen years has been derived, except 2,959 tons which have been taken to the furnace from the mines on the west side of the Cumberland Brook. The crop of the vein has been worked in shallow pits and trenches for a length of 3,953 feet, and shews good ore throughout. The main workings, however, and those from which the greater part of the ore has been raised, are confined to a length of about 740 feet, on the eastern end of the vein. In this portion of it there are six levels at various depths. The deepest, No. 6 on the accompanying plan, has been driven about 1,000 feet and is there about 200 feet beneath the surface.

For 600 feet it passed through barren ground; ore was then struck, and the level has since been driven 400 feet on the course of the vein, which is found to hold ore at the depth above mentioned, of the same rich character and as abundant as it did at the surface, retaining an average thickness of from three to four feet. No. 5 level is about 120 feet above No. 6. In it, and also in the upper levels 1, 2, 3 and 4, both the north and the south branches of the vein have been more or less worked, but none of the levels have extended westward beyond the 1,340 feet shewn in the plan and section as line No. 1. On the summit of the hill 282 feet above the No. 6 level, and 2,648 feet from its mouth, a substantial, well timbered shaft has been sunk, and is furnished with a 10 horse-power engine, and winding and pumping gear. In this shaft, which was commenced fifteen feet south of the crop, the vein was struck at 85 feet from the surface. No ore has been raised from this shaft, and at the time of my visit it was full of water. By sinking it a further depth of 197 feet, and connecting it with the No. 6 and with the other levels, 1,300 feet in length of the vein would be opened up to a depth of from 220 to 280 feet. A very insignificant quantity of ore has yet been taken from this ground, and supposing the vein to

continue through it, as there is every reason for believing it does, without any material change in its thickness or in the character of its contents, it may reasonably be expected to yield some seventy or eighty thousand tons of ore. Yield to be expected.

West of the Engine shaft, as far as can be judged from appearances on the surface, equal areas of the vein will probably be equally productive; and thus in this division of the property alone, the supply of ore is not likely to be speedily exhausted.

The mining Manager in charge of the Martin's Brook works stated that he could now without difficulty raise from the No. 5 and No. 6 levels, one thousand tons of ore per month, and deliver it at the furnace at Great Village River at (\$2.00) two dollars per ton. The accompanying plan and section of the ground between Martin's Brook and Cumberland Road, shew the character and position of the workings in this division, and afford a good idea of the extent of ground which remains to be worked. The datum-line in the section is the No. 6 level, but it should be observed that there is no reason for supposing that below this level the vein will prove less productive. As already stated the vein has been traced in this division to within one hundred and fifty yards of the Cumberland Road, when it appears to have been lost on the brow of the hill, 153 feet above the brook. At about fifty or sixty feet below this point the "Vipond" level (see plan) has been driven 300 feet in search of the vein, without, however, meeting with the success which, from the direction and the length of the level might have been anticipated; and no trace of the vein has been found crossing the Cumberland Road or Brook, notwithstanding that the rocks are fairly exposed. This apparent interruption of the vein on approaching the intersecting valleys from either one side or the other, and its reappearance on the opposite hill side is a somewhat remarkable fact, for the explanation of which further careful investigation is required. It may not improbably be connected with the occurrence of a series of large transverse, and more or less parallel dislocations, the courses of which are marked by the valleys. West of the Cumberland Brook in No. 4 of the Disappearance of vein on Cumberland Road and Brook. foregoing divisions, the vein reappears on the hill side at about one hundred and fifty feet above the brook, the interval from the last exposure of it on the opposite side of the valley being about 300 yards. The works here have extended for about 250 yards westward on the crop of the vein, most of the ore having been taken from shallow pits and trenches, the deepest not exceeding thirty feet. Ore is now being raised here from a level (Morrison's Hill level) in which the vein has been cut at 300 feet from the mouth and is stated to show a width of fifteen feet. There are now about 400 tons of ore on the surface. The position of the vein on this hill, if it is uninterrupted in depth, would enable it to be worked with great advantage from the Cumberland Brook, by an adit, which would probably not Division 4.

Farnen's Hill
vein.

Need of a care-
ful survey.

Supply of ore.

exceed five hundred feet in length before striking the ore. In this division a second parallel vein has also been discovered, and is known as the Farnen's Hill vein, the position of it, as shewn on the accompanying map, is about 920 yards north of the level on Morrison's Hill. It has a nearly east and west course, and underlies about 80° to the southward. One shaft thirty-seven feet deep has been sunk on it, and there are excavations at intervals along the crop for about one hundred yards, some of which are as much as twenty feet deep. About 200 tons of ore have been raised here, and are now piled on the bank. The vein has not been traced across the valley of Cumberland Brook, but traces of ore are said to have been found on the opposite hill, nearly due east of the outcrop on Farnen's Hill, and which may mark the continuation of the vein in that direction. To aid in forming sound and reliable conclusions respecting the nature of the veins, and the permanence of the ore deposits in depth, a careful measured survey should be made, from which to construct a plan, and longitudinal and cross sections, shewing accurately all the surface features and the outline of the ground, as well as the position, extent and depth of all the workings and the relative heights of the several ore croppings. The limited time which I could devote to the examination, and the want of any correct plans of the ground, as well as the condition, already mentioned of all the old workings, rendering them inaccessible for the purpose of examination, are causes which have combined to render my investigation less complete and satisfactory than it might have been under more favorable circumstances. I may, however, notwithstanding, state, that while there are no good reasons for supposing that at a greater depth than has yet been reached the vein will be found to be of greater width, and more regular position, neither are there any grounds whatever, for anticipating a change in the contrary direction; but that it will maintain characters corresponding with those which it exhibits on the line, where it is cut by the present surface, to depths far beyond those to which profitable mining can be carried is, however, in my opinion a view which is strongly supported by the probable circumstances connected with the origin of mineral veins of this kind, as also by the practical experience which has been gained elsewhere in working them. And though I was unable to verify by personal examination many of the statements respecting the appearance and dimensions of the vein where it has been exposed in old excavations, still the evidence I collected, and the facts I was able to determine, bearing on these points, are in my opinion of such a character as fully to warrant the conclusion, that no apprehensions need be entertained of any failure for years to come, in the supply of ore which the veins are capable of yielding, even if drawn upon to a much larger extent than heretofore.

So much has already been written and published by various authors, respecting the richness of the Londonderry ores and the excellent quality of

Quality of ore.

the iron made from them, and they have also been so thoroughly tested by practical working that it is superfluous for me to add anything on this subject. I have, however appended for reference the results of some of the examinations which have from time to time been made of them by different analysts; and also some analyses made by Dr. B. J. Harrington of specimens which I collected from different portions of the vein.

The accompanying map on a scale of 400 yards to one inch, of the ^{Map-} western section of the property, is plotted and drawn from measurements which I made on the ground, and the plan and longitudinal section of the vein, and the workings on it, in division 4 of the same section, are reduced from documents which were furnished me by Mr. Livesey.

ALFRED R. C. SELWYN.

Montreal, 12th Dec., 1872.

ANALYSES OF IRON ORE FROM LONDONDERRY.

Analyses.

<i>Ankerite.</i> 3 Varieties.	Dawson.	C. J. Jackson..	C. J. Jackson.	H. How.
	White.	Yellow.	Brown.	Brown.
Carbonate of Lime	54.0	43.80	49.20	51.61
Carbonate of Iron	23.2	23.45 }	20.30	19.59
Carbonate of Manganese		0.80 }		
Carbonate of Magnesia	22.0	30.80	30.20	28.6
Silicious Sand	0.5	0.10		0.13
	99.7	98.95	99.70	100.00
Yellow Ochrey Ore.	Dawson.	Red Ochrey Ore.		Jackson.
Peroxide of Iron	74.52	Peroxide of Iron		70.20
Alumina	4.48	Alumina		6.80
Carb. of Lime and Magnesia	40	Carb. of Lime		5.60
Silica and Silicates	6.20	Carb. of Magnesia		2.80
Water mostly combined	14.40	Silica		14.40
	100.00	Oxide of Manganese		0.40
				100.20

Mr. J. L. Hayes states respecting the quality of the Londonderry ores: "There is no trace of sulphur, arsenic or any foreign matter which can deteriorate the quality of the iron, or of titanium or chrome, which would render the ores refractory."

The ankerite appears to be generally mixed with spathose iron in considerable quantity, and is also traversed by thin veins of specular iron. It is consequently valuable not only as a flux but also as an ore containing from twenty to fifty per cent. of iron.

NOTES
ON SAMPLES OF IRON,
FROM THE
ACADIA MINES, NOVA SCOTIA.

BY
BERNARD J. HARRINGTON, B. A., Ph. D.

The accompanying analyses illustrate accurately the composition of six samples of ore from the Acadia mines, Nova Scotia.

Numbers I, II, and III have been made by myself, Nos IV, V and VI by Mr. Christian Hoffmann. In each case the mean of two closely agreeing analyses is given.

On glancing at the results it will be seen that five of the ores are what are commonly known as "Brown Hematites," consisting mainly of hydrated peroxide of iron ("Brown Hematite," or "Limonite," when pure, contains 85.6 per cent of peroxide of iron, and 14.40 per cent of water). The remaining ore (No VI) is what is known as "Specular Ore."

No I. (Cumberland Brook, North Vein) is a hard compact ore of a dark brown color and without lustre, except upon the surfaces of occasional cavities which are interspersed through it. The amount of phosphorus, though not so high as in many of the English "Brown Hematites," is nevertheless too large for it to be considered as a first class ore.

No II. (Cumberland Brook, South Vein) is yellowish-brown in color, earthy and rather friable. The large amount of manganese which it contains is worthy of note.

Nos IV. and V. (Martin's Brook and Ross' Farm) are of a dark brown color, and occur in lustrous botryoidal masses exhibiting a fibrous structure when broken.

No III. (From the Peter Totten Lot). The analysis of this sample shows it to be an exceedingly good ore. It differs from those already described in containing over 20 per cent. of carbonate of lime, and in being entirely free from phosphorus. Its freedom from the latter element, and its high percentage of manganese, would render it particularly valuable in the manufacture of steel.

No. VI. (Cook's Brook). This, as already mentioned, is a true "Specular Ore," the sample examined having only a surface coating of hydrated peroxide. It occurs in small crystals or scales of a steel-grey color. Like the last this is a valuable ore, containing in a high percentage of iron, only 0.003 p. c. of phosphorus and no sulphur.

A sample of the "Acadia Bar Iron," said to have been made from the Martin's Brook ore, I find to contain only 0.018 per cent. of phosphorus.

On account of the small amount of earthy constituents in most of the above ores, they might be advantageously smelted by mixing with the earthy and silicious ores which abound in other parts of Nova Scotia.

B. J. HARRINGTON.

Montreal, Feb. 3rd, 1873.

I.

ANALYSIS OF SAMPLE OF ORE FROM CUMBERLAND BROOK, NORTH VEIN, ACADIA MINES.

Peroxide of Iron	82.13	} Metallic Iron.....	58.27
Protoxide of Iron	1.00		
Protoxide of Manganese.....	0.72		
Alumina.....	0.66		
Lime.....	0.88		
Magnesia.....	0.25		
Silica	1.93		
Phosphoric Acid.....	0.86	Phosphorus.....	0.370
Sulphuric Acid.....	0.04	Sulphur.....	0.016
Water (hygroscopic).....	0.44		
Water (combined).....	11.07		
Total.....			99.98

Insoluble Residue.....	2.05
Specific gravity.....	3.77

II.

ANALYSIS OF SAMPLE OF ORE FROM CUMBERLAND BROOK, SOUTH VEIN, ACADIA MINES.

Peroxide of Iron.....	79.68	} Metallic Iron.....	55.77
Protoxide of Iron.....	—		
Protoxide of Manganese	2.51		
Alumina	0.63		
Lime	0.57		
Magnesia	0.34		
Silica.....	3.05		
Phosphoric Acid.....	0.44	Phosphorus.....	0.192
Sulphuric Acid.....	0.01	Sulphur.....	0.004
Water (hygroscopic).....	0.78		
Water (combined).....	11.65		
Total			99.66

Insoluble Residue (Silica).....	3.04
Specific gravity	3.43

III.

ANALYSIS OF SAMPLE OF ORE FROM PETER TOTTEN LOT. ACADIA MINES.

Peroxide of Iron.....	69.86	Metallic Iron.....	48.90
Protoxide of Iron.....	—		
Protoxide of Manganese.....	2.25		
Alumina	trace		
Lime.....	11.70		
Magnesia.....	0.42		
Silica	0.07		
Carbonic Acid.....	9.20		
Phosphoric Acid.....	—		
Sulphuric Acid.....	0.04	Sulphur.....	0.016
Water (hygroscopic).....	1.33		
Water (combined).....	5.74		
	<hr/>		
Total.....	100.61		
Insoluble Residue.....	0.07		
Specific gravity.....	3.29		

IV.

ANALYSIS OF SAMPLE OF ORE FROM ROSS' FARM, ACADIA MINES.

Peroxide of Iron	84.73	Metallic Iron.....	59.31
Protoxide of Iron.....	trace		
Protoxide of Manganese.....	0.23		
Alumina	0.23		
Lime	0.14		
Magnesia	0.14		
Phosphoric Acid.....	0.19	Phosphorus	0.086
Sulphuric Acid.....	0.01	Sulphur	0.004
Water (hygroscopic).....	0.33		
Water (combined).....	11.07		
Insoluble Residue.....	2.67		
	<hr/>		
Total.....	99.74		
		Sp. gr. 3.98	
The Insoluble Residue consisted of,			
Silica.....	2.54		
Alumina with trace of Iron.....	0.09		
	<hr/>		
	2.63		

V.

ANALYSIS OF SAMPLE OF ORE FROM MARTIN'S BROOK, ACADIA MINES.
(New Mine, No. 6 adit.)

Peroxide of Iron.....	82.65	Metallic Iron.....	57.85
Protoxide of Iron.....	trace		
Protoxide of Manganese.....	0.25		
Alumina.....	0.56		
Lime.....	0.15		
Magnesia.....	0.10		
Phosphoric Acid.....	0.38	Phosphorus	0.166
Sulphuric Acid.....	0.02	Sulphur.....	0.008
Water (hygroscopic).....	0.31		

Water (combined).....	10.51
Insoluble Residue.....	4.79
Total.....	99.72

Sp. Gr. 3.91

The Insoluble Residue consisted of

Silica.....	4.51
Alumina with trace of Iron.....	0.28
Total.....	4.79

VI.

ANALYSIS OF SAMPLE OF ORE FROM COOK'S BROOK, ACADIA MINES.

Peroxide of Iron.....	96.93	Metallic Iron.....	67.85
Protoxide of Iron.....	—		
Protoxide of Manganese.....	trace		
Alumina.....	0.33		
Lime.....	0.04		
Magnesia.....	0.11		
Phosphoric Acid.....	0.007	Phosphorus.....	0.003
Sulphuric Acid.....	—		
Water (hygroscopic).....	0.03		
Water (combined).....	0.79		
Insoluble Residue.....	1.26		
Total.....	99.497		

Sp Gr. 5.93

The Insoluble Residue consisted of,

Silica	1.20
Alumina with trace of Iron.....	0.07
Total.....	1.27