

909A

Bundle 51 # 2

REPORT  
ON  
EXPLORATIONS OF THE IRON ORE DEPOSITS OF PICTOU COUNTY,

NOVA SCOTIA,

By MR. G. M. DAWSON, Associate of the Royal School of Mines, Jermyn Street, London.

Report  
G. M. Dawson  
1875

The following Statements relate to explanatory works conducted in October last on the iron deposits of Pictou County. The object of these explorations was more fully to open up the deposits and to ascertain their precise extent and value. I shall confine myself in the main to results of these examinations, referring for other facts to previous reports on the properties.

**SPATHIC IRON ORE**, near Sutherland's River, Merigomish. This very pure ore occurs as a bed in lower carboniferous rocks. The surface of the country is very deeply and uniformly covered by drift material, and explorations on the area have been attended with considerable difficulty, it having been necessary to sink and cross-cut in the enclosing rocks. The ore is very well exposed in the bank of a brook. At this point, and near the level of the brook a shaft 14 ft. deep has been made, and the ore proven to that depth, and its general character more clearly defined. It is evidently somewhat modular in structure, being softer and harder in some places, and its junction with the overlying and underlying rocks having an undulating character.

At the brook level the bed has a thickness of 10 ft. 6 in. At the bottom of the shaft this has decreased to 6 ft. 6 in., and it is probable that the ore, as followed, will continue thinning and thickening alternately.

The dip of the ore and surrounding rocks is about S. 25° E., at an angle of 60°, and underlying the main bed of ore about 4 ft. was a small ore bed 6 in. in thickness. A small shaft was sunk both East and West of the brook exposure, and at distances from it of 941 and 215 ft. respectively. The measures have been cross-cut several feet North and South in each, but as yet without discovering the ore bed. Small strings and layers of carbonate of iron contained in reddish clayey sandstone were passed through in both places, showing that the bed was not far off; and in the North level from the West shaft, when we were obliged to suspend operations, the prospects seemed very good.

This ore is a very pure crystalline carbonate of iron. Surface specimens are of a rusty colour, but in depth and where it is unacted on by the weather, it has a pearly grey appearance. It would yield a very superior quality of iron, and will be specially valuable for mixture with the more silicious ores from others of the areas.

**RED HEMATITE.**—This deposit is situated on area 101, and has, by its outcrop surface masses of ore, been traced completely across the area in a general direction nearly East and West. The ore occurs as a bed in greyish and black slates, and on the whole dips Northward, generally at a high angle. The Western end of the outcrop, being on high ground and easy of access, was chosen as the part of the bed where information concerning its general character and thickness could be most easily obtained. In the course of the operations, about a mile of the outcrop has been well defined by trenching, and openings in the substance of the ore itself, from which a considerable quantity of ore has been blasted out, and now lies in heaps at the surface.

In the furthest East trench made on the outcrop of the ore bed (marked A in Plan), it is nearly vertical, and shows 22 ft. of ore, the greater part of which is of excellent quality, and almost free from intercalated layers of slate. At a distance of 594 ft. Westward from this trench, an opening of some size, and going down about 10 ft. on the ore, has been made (section I). The dip of the bed is here N. 29° E. at an angle of 58°. The upper layer of ore is 4 ft. 4 in. thick, and rests upon a second layer 3 ft. in thickness. Below this is a parting of slate 2 ft. 11 in., and underlying this a third ~~trench~~ bench of very good ore 3 ft. 3 in. thick. There is thus altogether, and deducting the slate parting, 10 ft. 7 in. of ore. At 198 ft. West of this opening is a trench completely crossing the outcrop, and showing a section of the bed, ~~increasing~~ increasing on the surface and including some small slate partings, 27 ft. across. The dip is here N. 15° E. at an angle of 62°. Near this trench the outcrop changes its course, and bends sharply off to the North, passes round the nose of an anticlinal, returns nearly South, and then resumes its old East-West course. Both sides of this anticlinal have been explored, and the appearance of the ore is specially good, both as regards its quality and thickness. In the opening on the East side (section II., and marked in Plan), in which the ore bed was followed down about 15 ft. on the dip, the lowest bench of ore is of very excellent quality and 6 ft. in thickness. Above this lies 3 ft. 10 in. of slate and slaty ore. Then 3 ft. of ore. Next a bench of 2 ft. 6 in. of ore, and above this three layers of ore, each about a foot thick. The slate roof was not actually reached, as the rock fell away rapidly under the drift material. The total thickness proven amounted to 14 ft. 6 in.

On the West side of the anticlinal a considerable length of outcrop has been bared of trees and soil, and shows ore of good quality and great surface breadth (about 30 ft.), though the dip, not being distinctly shown, the precise thickness remained undetermined.

At the exposure (marked D in Plan) the ore has resumed its old course, and runs nearly East and West. It is nearly vertical, and about 15 ft. in width.

In the woods to the West of this last opening numerous fragments of ore occur in the line of the outcrop of the bed, as indicated by the general strike of the slates. At the Western end of these indications a trench has been made and the ore exposed, though in the place chosen the bed is considerably fractured by small faults.

The ore itself is a very compact, somewhat silicious, red Hematite. As the ground slopes rapidly away to the South, drainage of any workings upon it will be easy. The ore might first be extracted by open cast, as the outcrop and a vast quantity would in this way be easily obtainable. The ore, though hard under the drill, yields easily to powder, and might, I believe, at the present value of labour, be extracted at from 80c. to \$1 per ton.

It will be observed that the ore has a general tendency to improve in proceeding Eastward, and in this direction is shown to exist quite across area 101 by exposures of outcrop and surface masses, as indicated in the General Plan attached to previous reports.

**SPECULAR IRON ORE.**—This ore occurs on the square mile marked 100 on the Government Plan. The country rock is a blackish slate with occasional beds of quartzite, and it is with one of the latter beds that the ore is most closely associated, the strata are in general undulating, and in places somewhat contorted, but preserve a pretty uniform Southerly dip at an angle of from 60° to 70°.

The ore deposit occurs as a true lode following very nearly the strike of the containing rocks, and so far as our explorations have gone, appearing to be as nearly as possible vertical. It has been exposed by trenching and proved by small shafts from the Eastern boundary of the area Westward for a considerable distance, though as yet not quite across to the Western line. Of its extension across the entire area, however, there can be no doubt from its indications, and the ore is known to occur on some of the other areas both East and West of this, though its value has not yet been proven by actual exposure of its thickness and quality.

At the Eastern boundary of area 100 the outcrop of the lode is exhibited in a trench (marked A in Plan) and shows a thickness of 12 ft. of ore, though with some thin

Measure

a |

+

⊖

g

the

b

⊙

on

The

⊙

leaves of intercalated slate. A short distance West of this is another costeaning trench in <sup>a</sup> which the lode is shown to have a thickness of 5 ft. 6 in. of good and pure ore.

About 900 feet Westward from this, a shaft 18 ft. deep has been sunk on the crop of the lode. At a short distance from the surface a horse of hard quartzite rock, more or less impregnated with ore, encroached on the Southern side, but at the bottom this was passed through and the ore found passing under and cutting it out. The lode was cross-cut at a depth of 13 ft. and the thickness found to be 10 ft., including, however, about a foot of slate. At the bottom of the shaft the lode was widening. From this shaft alone about 40 tons of good ore were extracted. In connection with the quartzite horse and wall a small quantity of iron pyrites was found in association with the ore.

From this shaft ~~to 86~~ ft. westward on the course of the lode a second opening (marked C on Plan) was made and carried down to a depth of about 13 ft. At this place the true lode was missed, and quartzite and hard slate impregnated with ore continued to the bottom. By subsequent trenching (marked D) the lode was discovered to lie about 30 ft. South of the shaft, and it there exhibited a very favourable appearance, and showed 20 ft. of good and very pure ore. The southern wall was not found, as the rock dipped away fast, and the water was troublesome.

This deposit of specular and micaceous iron ore is situated like the red hematite on high ground, and the course of the lode is cut across in several places by deep brook vallies, which, though encumbered by drift and ~~penetrating~~ good exposures of the deposit at present, will offer great advantages by allowing free drainage to a very considerable depth.

**LIMONITE OR BROWN HEMATITE.**—This valuable ore is situated on the North side of the East River, about 2 miles above Springville, and covered by the area marked 5 on the Government Plan.

The deposit is indicated by a great quantity of surface masses of ore, some of them of considerable size; and these indications extend in a nearly North and South direction for a considerable distance on the North side of the river. Explorations on this deposit have been unavoidably detained to the last, but a few days' work has given a much better knowledge of its character and extent. The lode itself has been exposed in a small brook, and appears to run in a ~~line~~ nearly at right angles to the general line of the indications. It would, therefore, appear probable that its course will be found to change considerably, or that it has been shifted by small faults. The lode where exposed shows a thickness of about 15 ft. of solid ore, or nearly double that ascertained by the first opening in which measurements spoken of in previous reports were taken. One side of the ore is bounded by a wall of solid slate, while at the other side the cheek of the solid ore is followed down by a deposit of concretionary ore 2 ft. 8 in. in width and thickening downward. The South wall of the concretionary ore, or "ore gravel," is formed of very stiff red and white clay, apparently formed from slate rock decomposed in place. The "ore gravel" was excavated from between the solid ore and the clay to a depth of 8 ft., and for several feet in length; and the South cheek of the solid ore, thus exposed, was found to be almost precisely vertical. (See section 3.)

The indications, in the form of boulders, which induced search in this brook, are small compared with those that exist on other parts of the property, on which we have as yet been unable to do any work. At one place a great quantity of very large masses of ore, some of them weighing several tons, are to be seen partly exposed; and ore masses, of greater or less size, extend quite across the area.

<sup>a</sup> At a place (marked C in Plan) a large show of surface fragments attracted attention; and pits and costeaning proved the persistence of fragments to 25 and 30 ft. in depth in the alluvial matter. At this place the ore contained a considerable quantity of crystalline black <sup>x</sup> oxide of manganese in admixture with it.

The various ores above described are in the neighbourhood of the great coal deposits of Pictou County, and are therefore very favourably situated for the manufacture of iron on a

1086

presenting no

direction

large scale. The Specular Ore, Hematite, and Limonite are all in the vicinity of the East River, and so situated that they might be connected by branches with a single railway following the course of the river valley. The valley is admirably suited for such a railway, being flat, and in great part consisting of "intervale" land. The proposed railway would strike the Government railway near Hopewell, at the forks of the East River, and here it might be best to erect furnaces.

F  
F

Broad gauge colliery railways have cost in this vicinity from \$15,000 to \$20,000 per mile, but should it be decided to erect furnaces at the forks, and there to meet the coal brought by the provincial railway; a narrow gauge road would be quite suitable for the transport of the iron ores, and could be completed for a very much smaller sum.

Limestone of good quality and in great abundance exists in the valley of the East River, and quarries could be opened in immediate proximity to the railway. In a quarry just above Springville, 15 ft. of very pure limestone is worked. Another bed not worked, but said to be 6 ft., underlies this, and still lower in the series is an immense bed of blackish limestone, said to yield a very strong lime.

Any railway passing down the valley of the river would have to pass over the crops of those beds. The limestone at present worked is quarried free for 40 cents per ton.

The coal of Pictou County has been shown by numerous analyses to be very free from sulphur, and is adapted for the manufacture of good hard coke. There are at present four coal mines in active operation, and others preparing for work. The price has now for some time remained at \$2 (8s.) per ton delivered on board ship at the various loading grounds.

In connection with the coal beds are fire clays, and should a demand for fire bricks arise, in all probability some of these will prove well suited for their manufacture. Fire bricks formerly manufactured from a clay in the neighbourhood of New Glasgow were considered to be of excellent quality.

Labour at present commands from \$1 to \$1.50 (4s. to 6s.) per diem.

GEORGE M. DAWSON.

McGILL COLLEGE, MONTREAL,  
Nov. 18, 1872.



## REPORT

ON

### EXPLORATIONS OF THE IRON ORE DEPOSITS OF PICTOU COUNTY,

NOVA SCOTIA,

By Mr. G. M. DAWSON, *Associate of the Royal School of Mines, Jermyn Street, London.*

The following Statements relate to exploratory works conducted in October last on the iron deposits of Pictou County. The object of these explorations was more fully to open up the deposits and to ascertain their precise extent and value. I shall confine myself in the main to results of these examinations, referring for other facts to previous reports on the properties.

**RED HEMATITE.**—This deposit is situated on area 101, and has, by its outcrop and surface masses of ore, been traced completely across the area in a general direction nearly East and West. The ore occurs as a bed in greyish and black slates, and on the whole dips Northward, generally at a high angle. The Western end of the outcrop, being on high ground and easy of access, was chosen as the part of the bed where information concerning its general character and thickness could be most easily obtained. In the course of the operations, about a mile of the outcrop has been well defined by trenching, and openings in the substance of the ore itself, from which a considerable quantity of ore has been blasted out, and now lies in heaps at the surface.

In the furthest East trench made on the outcrop of the ore bed (marked A in Plan), it is nearly vertical, and shows 22 ft. of ore, the greater part of which is of excellent quality, and almost free from intercalated layers of slate. At a distance of 594 ft. Westward from this trench, an opening of some size, and going down about 10 ft. on the ore, has been made (section I). The dip of the bed is here N. 29° E. at an angle of 58°. The upper layer of ore is 4 ft. 4 in. thick, and rests upon a second layer 3 ft. in thickness. Below this is a parting of slate 2 ft. 11 in., and underlying this a third bench of very good ore 3 ft. 3 in. thick. There is thus altogether, and deducting the slate parting, 10 ft. 7 in. of ore. At 198 ft. West of this opening is a trench completely crossing the outcrop, and showing a section of the bed, measuring on the surface and including some small slate partings, 27 ft. across. The dip is here N. 15° E. at an angle of 62°. Near this trench the outcrop changes its course, and bends sharply off to the North, passes round the nose of an anticlinal, returns nearly South, and then resumes its old East-West course. Both sides of this anticlinal have been explored, and the appearance of the ore is specially good, both as regards its quality and thickness. In the opening on the East side (section II., and marked in Plan), in which the ore bed was followed down about 15 ft. on the dip, the lowest bench of ore is of very excellent quality and 6 ft. in thickness. Above this lies 3 ft. 10 in. of slate and slaty ore. Then 3 ft. of ore. Next a bench of 2 ft. 6 in. of ore, and above this three layers of ore, each about a foot thick. The slate roof was not actually reached, as the rock fell away rapidly under the drift material. The total thickness proven amounted to 14 ft. 6 in.

On the West side of the anticlinal a considerable length of outcrop has been bared of trees and soil, and shows ore of good quality and great surface breadth (about 30 ft.), though the dip, not being distinctly shown, the precise thickness remained undetermined.

At the exposure (marked D in Plan) the ore has resumed its old course, and runs nearly East and West. It is nearly vertical, and about 15 ft. in width.

In the woods to the West of this last opening numerous fragments of ore occur in the line of the outcrop of the bed, as indicated by the general strike of the slates. At the Western end of these indications a trench has been made and the ore exposed, though in the place chosen the bed is considerably fractured by small faults.

The ore itself is a very compact, somewhat silicious, red Hematite. As the ground slopes rapidly away to the South, drainage of any workings upon it will be easy. The ore might first be extracted by open cast, on the outcrop, and a vast quantity would in this way be easily obtainable. The ore, though hard under the drill, yields easily to powder, and might, I believe, at the present value of labour, be extracted at from 80c. to \$1 per ton.

It will be observed that the ore has a general tendency to improve in proceeding Eastward, and in this direction is shown to exist quite across area 101 by exposures of outcrop and surface masses, as indicated in the General Plan attached to previous reports.

**SPECULAR IRON ORE.**—This ore occurs on the square mile marked 100 on the Government Plan. The country rock is a blackish slate with occasional beds of quartzite, and it is with one of the latter beds that the ore is most closely associated. The strata are in general undulating, and in places somewhat contorted, but preserve a pretty uniform Southerly dip at an angle of from 60° to 70°.

The ore deposit occurs as a true lode following very nearly the strike of the containing rocks, and so far as our explorations have gone appearing to be as nearly as possible vertical. It has been exposed by trenching and proved by small shafts from the Eastern boundary of the area Westward for a considerable distance, though as yet not quite across to the Western line. Of its extension across the entire area, however, there can be no doubt from the indications, and the ore is known to occur on some of the other areas both East and West of this, though its value has not yet been proven by actual exposure of its thickness and quality.

At the Eastern boundary of area 100 the outcrop of the lode is exhibited in a trench (marked A in Plan) and shows a thickness of 12 ft. of ore, though with some thin leaves of intercalated slate. A short distance West of this is another costeening trench in which the lode is shown to have a thickness of 5 ft. 6 in. of good and pure ore.

About 900 feet Westward from this a shaft 18 ft. deep has been sunk on the crop of the lode. At a short distance from the surface a horse of hard quartzite rock, more or less impregnated with ore, encroached on the Southern side, but at the bottom this was passed through and the ore found passing under and cutting it out. The lode was cross-cut at a depth of 13 ft. and the thickness found to be 10 ft., including, however, about a foot of slate. At the bottom of the shaft the lode was widening. From this shaft alone about 40 tons of good ore were extracted. In connection with the quartzite horse and wall a small quantity of iron pyrites was found in association with the ore.

From this shaft 1086 ft. westward on the course of the lode a second opening (marked C on Plan) was made and carried down to a depth of about 13 ft. At this place the true lode was missed, and quartzite and hard slate impregnated with ore continued to the bottom. By subsequent trenching (marked D) the lode was discovered to lie about 30 ft. South of the shaft, and it there exhibited a very favourable appearance, and showed 20 ft. of good and very pure ore. The southern wall was not found, as the rock dipped away fast, and the water was troublesome.

This deposit of specular and micaceous iron ore is situated like the red hematite on high ground, and the course of the lode is cut across in several places by deep brook vallies, which, though encumbered by drift and presenting no good exposures of the deposit at present, will offer great advantages by allowing free drainage to a very considerable depth.

**LIMONITE OR BROWN HEMATITE.**—This valuable ore is situated on the North side of the East River, about 2 miles above Springville, and covered by the area marked 5 on the Government Plan.

The deposit is indicated by a great quantity of surface masses of ore, some of them of considerable size; and these indications extend in a nearly North and South direction for a considerable distance on the North side of the river. Explorations on this deposit have been unavoidably detained to the last, but a few days' work has given a much better knowledge of its character and extent. The lode itself has been exposed in a small brook, and appears to run in a direction nearly at right angles to the general line of the indications. It would, therefore, appear probable that its course will be found to change considerably, or that it has been shifted by small faults. The lode where exposed shows a thickness of about 15 ft. of solid ore, or nearly double that ascertained by the first opening in which measurements spoken of in previous reports were taken. One side of the ore is bounded by a wall of solid slate, while at the other side the cheek of the solid ore is followed down by a deposit of concretionary ore 2 ft. 8 in. in width and thickening downward. The South wall of the concretionary ore, or "ore gravel," is formed of very stiff red and white clay, apparently formed from slate rock decomposed in places. The "ore gravel" was excavated from between the solid ore and the clay to a depth of 8 ft., and for several feet in length; and the South cheek of the solid ore, thus exposed, was found to be almost precisely vertical. (See section 3.)

The indications, in the form of boulders, which induced search in this brook, are small compared with those that exist on other parts of the property, on which we have as yet been unable to do any work. At one place a great quantity of very large masses of ore, some of them weighing several tons, are to be seen partly exposed; and ore masses, of greater or less size, extend quite across the area.

At a place (marked C in Plan) a large show of surface fragments attracted attention; and pits and costeening proved the persistence of fragments to 25 and 30 ft. in depth in the alluvial matter. At this place the ore contained a considerable quantity of crystalline black oxide of manganese in admixture with it.

The various ores above described are in the neighbourhood of the great coal deposits of Pictou County, and are therefore very favourably situated for the manufacture of iron on a large scale. The Specular Ore, Hematite, and Limonite are all in the vicinity of the East River, and so situated that they might be connected by branches with a single railway following the course of the river valley. The valley is admirably suited for such a railway, being flat, and in great part consisting of "intervale" land. The proposed railway would strike the Government railway near Hopewell, at the forks of the East River, and here it might be best to erect furnaces.

Broad gauge colliery railways have cost in this vicinity from \$15,000 to \$20,000 per mile, but should it be decided to erect furnaces at the forks, and there to meet the coal brought by the provincial railway; a narrow gauge road would be quite suitable for the transport of the iron ores, and could be completed for a very much smaller sum.

Limestone of good quality and in great abundance exists in the valley of the East River, and quarries could be opened in immediate proximity to the railway. In a quarry just above Springville, 15 ft. of very pure limestone is worked. Another bed not worked,

but said to be 6 ft., underlies this, and still lower in the series is an immense bed of blackish limestone, said to yield a very strong lime.

Any railway passing down the valley of the river would have to pass over the crop of those beds. The limestone at present worked is quarried free for 40 cents per ton.

The coal of Pictou County has been shown by numerous analyses to be very free from sulphur, and is adapted for the manufacture of good hard coke. There are at present four coal mines in active operation, and others preparing for work. The price has now for some time remained at \$2 (8s.) per ton delivered on board ship at the various loading grounds.

In connection with the coal beds are fire clays, and should a demand for fire bricks arise, in all probability some of these will prove well suited for their manufacture. Fire bricks formerly manufactured from a clay in the neighbourhood of New Glasgow were considered to be of excellent quality.

Labour at present commands from \$1 to \$1.50 (4s. to 6s.) per diem.

GEORGE M. DAWSON.

McGILL COLLEGE, MONTREAL,  
Nov. 18, 1872.

*Requie  
8m*

*Pictou*

