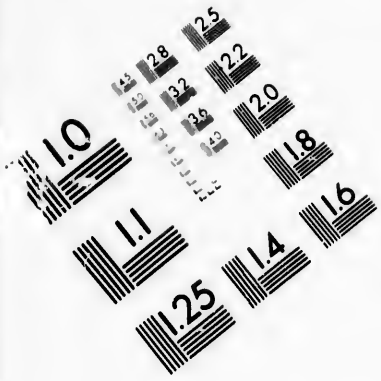


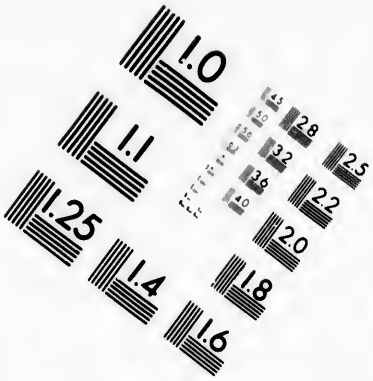


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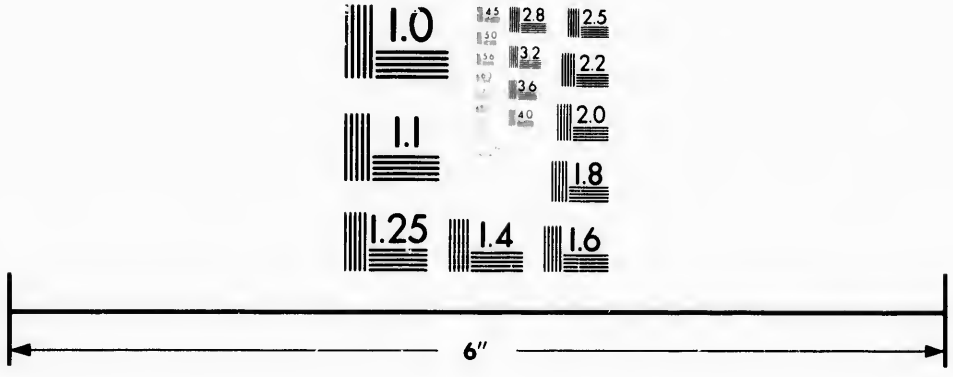


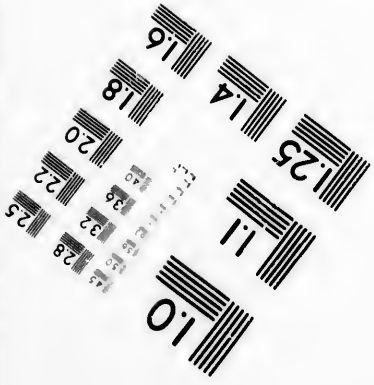


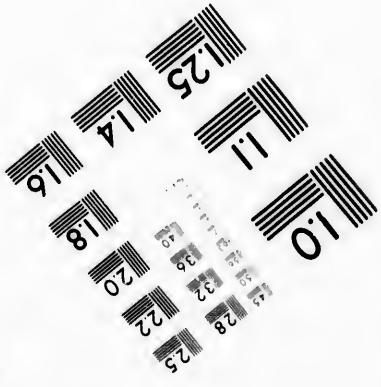


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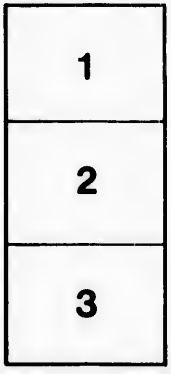


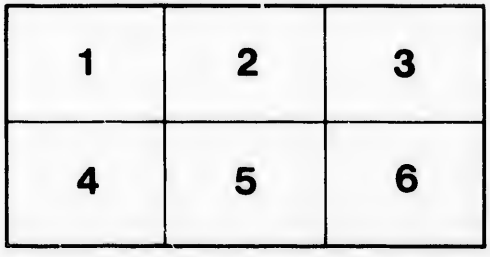


32X

THE

# NEWFOUNDLAND

# CONSOLIDATED COPPER MINING COMPANY.

CAPITAL, $3,000,000.

$2,500,000 FULLY PAID STOCK.

$500,000 TREASURY STOCK.

SHARES, $50 EACH.

SHARES UNASSESSABLE.

---

MINES IN NOTRE DAME BAY, NEWFOUNDLAND.

---

NEW YORK:
FRANCIS HART & CO. PRINTERS, 63 & 65 MURRAY STREET.
1881.

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NEW YORK:
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1881
(9)

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Of Messrs. Allen & Stead, Bankers, 62 Broadway, New-York.

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*Secretary,*
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Attorney-General and Premier of Newfoundland.
HON. AUGUSTUS W. HARVEY,
Merchant, and Member of Legislative Council of Newfoundland.
ERASTUS WIMAN, of Dun's Mercantile Agency;
CHARLES M. STEAD, Banker;
HARRY ALLEN, Banker;
ROBERT J. KIMBALL, Banker;
THEODORE E. LEEDS, Counselor-at-Law.

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IN NEWFOUNDLAND.

SIR WILLIAM VALLANCE WHITEWAY, K. C. M. G.
HON. AUGUSTUS W. HARVEY.

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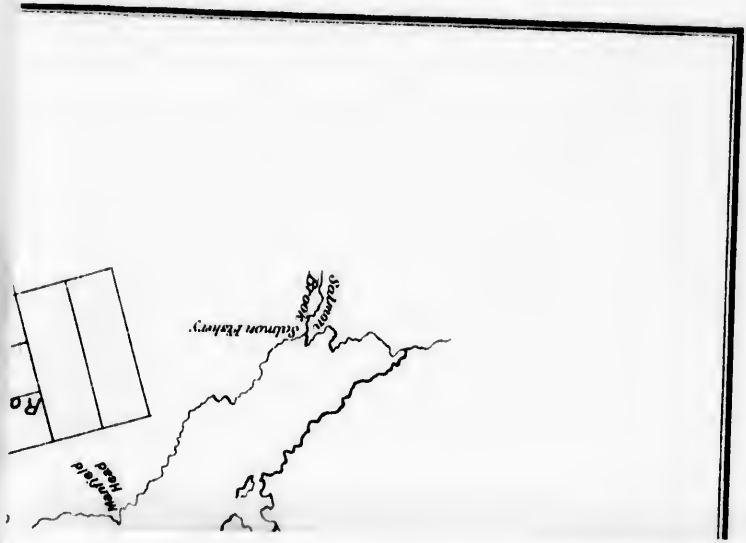
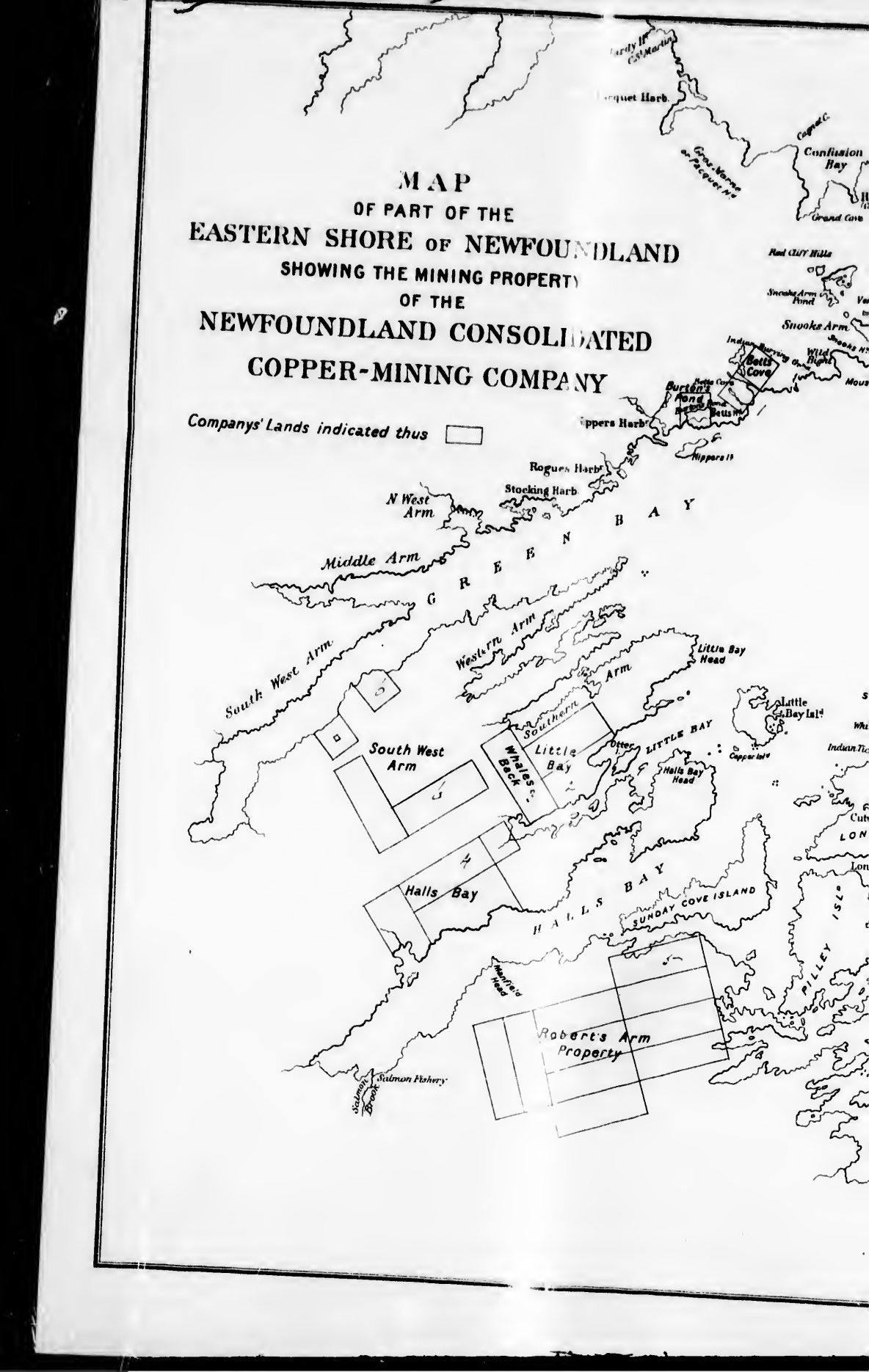
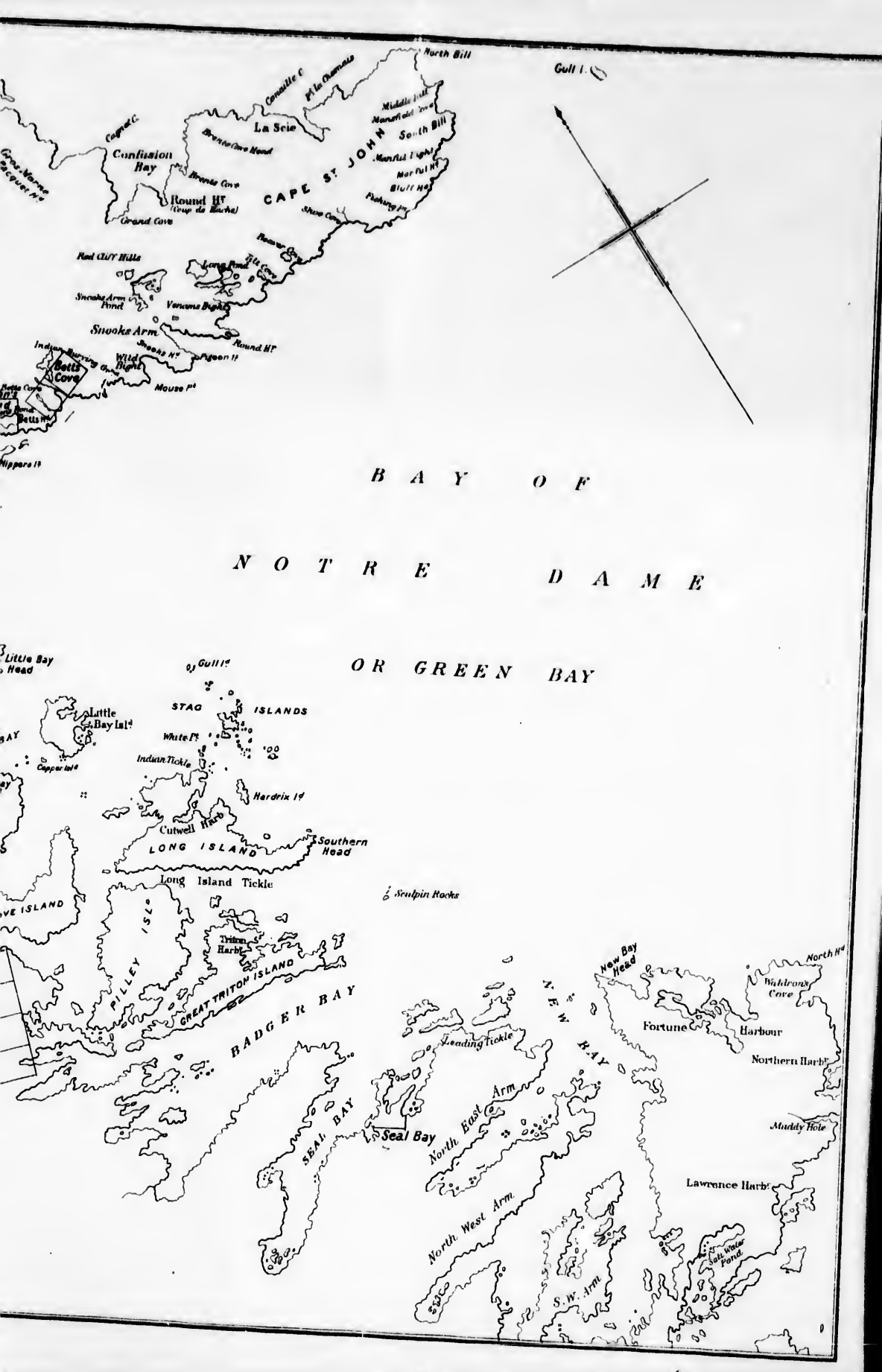

Solomon Brook
Solomon Bakery
Mansfield Head
RD


MAP
OF PART OF THE
EASTERN SHORE OF NEWFOUNDLAND
SHOWING THE MINING PROPERTY
OF THE
NEWFOUNDLAND CONSOLIDATED
COPPER-MINING COMPANY
Companys' Lands indicated thus
Confusion Bay
Grand Cove
Red Cliff Hills
Snooks Arm
Betts Cove
Burton's Pond
Tippers Harb.
Rogues Harb.
Stocking Harb.
N West Arm
Middle Arm
GREEN BAY
Western Arm
South West Arm
Southern Arm
Little Bay Head
Little Bay Isl.
Little Bay
Whales Back
South West Arm
Otter
LITTLE BAY
Halls Bay Head
Halls Bay
HALLS BAY
SUNDAY COVE ISLAND
Robert's Arm Property
Salmon Brook
Salmon Fishery
PILLEY ISLO


North Bill
Gull I.
La Scie
Confusion Bay
CAPE ST. JOHN
South Bill
Round Hd
Red Cliff Hills
Snooks Arm
Snooks Arm Pond
Venams Bight
Betts Cove
Wild Bight
Mouse Pt
Hippare Is
BAY OF NOTRE DAME OR GREEN BAY
Little Bay Head
Gull Is
STAG ISLANDS
Little Bay Isl
White Pt
Indian Tickle
Hardrix Is
Cutwell Hard
LONG ISLAND
Southern Head
Long Island Tickle
Sculpin Rocks
Triton Harbr
PILLEY ISL
GREAT TRITON ISLAND
BADGER BAY
SEAL BAY
Seal Bay
Leading Tickle
NEW BAY
New Bay Head
North Hd
Wadhams Cove
Fortune Harbour
Northern Harbr
Muddy Hole
Lawrence Harbr
North East Arm
North West Arm
S.W. Arm
Salt Water Pond

# NEWFOUNDLAND

# CONSOLIDATED COPPER MINING CO.

The various properties owned and controlled by this Company are situated in Notre Dame Bay and its immediate neighborhood, on the island of Newfoundland, within five days' steam of the United States, and eight days from Swansea, the great copper market of England.

These mines have hitherto been worked by private enterprise, although some of them have, for two years past, been incorporated under the title of a Limited Company, with only three individual stockholders, the terms of the organization being such as to prevent any one of the stockholders disposing of any of his stock. The discontinuance of this limited company, which was in fact a partnership, became necessary in consequence of the death of the senior partner. Without a re-organization too many difficulties were presented to the operating of numerous developments which have been initiated on the properties. At the present time there are five independent mines in active operation, with their houses, stores, and necessary machinery. Provision was also required for the working of several other deposits of copper ore which have been discovered, and which from their character warrant development.

Many of the properties are owned by the Company. The remainder are held under leases, the original lessees having procured their rights from the government of Newfoundland.

Any British subject can claim on land not already granted a right of search for minerals over an area of three square miles, on payment of £5. Within two years of obtaining it he must select one square mile from these, the other two square miles lapsing to the government. If, on a grant, the grantee shall spend £4,000 within eleven years, it becomes his property in perpetuity in fee simple.

At Betts Cove, Little Bay, Robert's Arm, Hall's Bay, and Southwest Arm, amounts far exceeding the stipulated £4,000 have already been spent.

The following table represents the area of each property which the Company may possess in absolute fee simple on complying with the foregoing regulations, the numbers being added for reference to the accompanying map:

| | | |
|---|---|---|
| No. 1. | Betts Cove . . | 2 square miles. |
| " 2. | Little Bay . . | 2 " " |
| " 3. | Whale's Back . | 1 square mile. |
| " 4. | Hall's Bay . . | 4 square miles. |
| " 5. | Robert's Arm . | 11 " " |
| " 6. | Southwest Arm . | 4 " " |
| " 7. | Seal Bay . . | 1 square mile. |
| " 8. | Burton's Pond . | 1 " " |
| " 9. | Otter Island . | 1 " " |

Making a total of 27 square miles, or 17,280 acres.

Royalty paid to the original lessees of the properties now held by the Betts Cove Mining Co. and Robert's Arm mine:

| | |
|---|---|
| Betts Cove . . . . | 2*s.* per ton of ore. |
| Little Bay . . . . | 4*d.* per unit. |
| South West Arm . . . | 5*d.* " " |
| Hall's Bay . . . . | 4*d.* " " |
| Robert's Arm . . . | 5*s.* per ton. |

Six of the licenses at Robert's Arm are free of royalty; also two at Hall's Bay, and the one at Seal Bay.

The Betts Cove mine is situated at Betts Head, three-quarters of a mile from the harbor, with which it is connected by a tramway of two inclines, fully fitted with brake-houses, cars, wire rope, and all necessary equipments, the tramways being laid with 60-lb. iron rails. In addition to three-quarters of a mile of wharfage, Betts Cove has two retail stores for the supply of the employés and their families; upwards of 160 houses, affording accommodation for 1,800 persons; three churches, engineers' workshops, with iron and brass foundry, school-room, and hospital capable of accommodating 20 patients, besides numerous stores for grain, hay, provisions and necessary mining stock.

2. LITTLE BAY.—Is situated about 15 miles south-west of Betts Cove, which it rivals in the rapidity of its development, and in the magnitude of its ore deposit. Two years only have elapsed since its discovery, during which period 45,000 tons of copper ore, of an average value of $20 per ton, have been shipped to England; while there are at present on the ground 7,500 tons ready for shipment, and in addition 40,000 tons of undressed ore are on the reserve dumps. The outcrop of ore is exposed on the strike for 1,000 feet, on which are sunk eight shafts, from 80 to 150 feet apart, the deepest being 260 feet. The stopes in Nos. 5 and 6 are 35 feet wide of solid ore, requiring hardly any picking before shipment. Here a complete mining town has been established, consisting of over 200 houses, with school-house and chapel. The mine is connected by a substantial inclined tramway, perfectly equipped and laid with 60-lb. rails, with a pier, alongside which vessels of any tonnage may lie in perfect security, the harbor being completely landlocked except at one narrow inlet. In close proximity to the tramway and wharf are situated the smelting works, consisting of three cupola furnaces, each capable of reducing 10 tons of ore to regulus in 24 hours.

Near the mine are two large ponds, capable of supplying any necessary amount of water for washing and concentrating operations.

In addition to the buildings, plant, and machinery above enumerated, the Company possesses a powerful steamer, with a steam launch, used for intercommunication between the different mines. This steamer is of great power, having been built for a steam-tug; last year she was enlarged and put in thorough order, and is of great use, not only as a means of communication between the different ports, but as a means of towing sailing-vessels in and out of harbor.

Attention is called to the appended letter of Mr. Francis Ellershausen. This gentleman is entitled to the credit of developing the copper-mining industry of Newfoundland, and of bringing it to its present prosperous condition. With admirable pluck and energy he initiated the adventure as a personal enterprise in the fall of 1874, but soon after two partners joined him, and ultimately, in the fall of 1878, The Betts Cove Mining Company, limited, was organized by them. Mr. Ellershausen has been the active manager throughout the entire time.

There are also appended a report on all of the mines at present being wrought by the Company by Joseph W. Revere, M. E., a report on the Robert's Arm Mine, by T. Sopwith, member Inst. C. E., and a report by David Rankine, M. E., on the Betts Cove mine.

## THE OFFICIAL REPORT OF ALEXR. MURRAY

To Sir John H. Glover, Governor of Newfoundland, in 1879, shows the following shipments of ores from the Betts Cove and Little Bay Mines:

| | | | Tons. |
|---|---|---|---|
| 1874 } 1875 } | Betts Cove Mine | . | 8,000 |
| 1876, | " " " | . . | 18,000 |
| 1877, | " " " | . . | 44,000 |
| 1878, | " " " | 25,000 | |
| 1878, | Little Bay Mine | 10,000 | |
| | | ——— | 35,000 |

Add to the above shipments for

| | |
|---|---|
| 1879, from Betts Cove and Little Bay | 30,000 |
| 1880, to September 24, Betts Cove and Little Bay | 24,000 |
| 1880, additional tonnage on hand ready for shipment to January 15, 1881 | 10,020 |

As follows:

| | | |
|---|---|---|
| Little Bay | 7,500 | |
| Betts Cove | 1,250 | |
| Robert's Arm | 1,000 | |
| Southwest Arm | 150 | |
| Hall's Bay | 120 | |
| Total production | | 169,020 |

Net value of ore shipments, November, 1878, balance sheet, taken upon formation of the Betts Cove Co. Shows 105,000 tons shipped, at net value . $850,000

(All spent on construction and for opening mines.)

Net value of shipment in 1879, 30,000 tons . 225,000

Estimated value of shipment to October, 1880, 24,000 tons . . . . . 175,000

Total net value . . . $1,250,000

The full market value of the metal from the total ore product may be fairly stated at $3,500,000.

## ESTIMATED PRESENT RESERVES.

### As per Report of Joseph W. Revere, M. E.

| | |
|---|---|
| Little Bay Mine, 30,000 tons per annum, 8 years ahead . . . . . | 250,000 tons. |
| Betts Cove Mine, 8,000 tons per annum, for 5 years . . . . . | 40,000 " |

Besides, for several years, 650 tons per month from new workings.

### As per Report of T. Sopwith, Member Inst. C. E.

| | |
|---|---|
| Robert's Arm Mine, 4,000 tons per annum for 20 to 30 years, say . . . . . | 100,000 tons. |

(This is 12 per cent. ore.)

In addition, products will be made from Hall's Bay and Southwest Arm Mines, which are both in ore, as per report of Mr. Revere.

| | |
|---|---|
| The value of the plant at the different mines, as estimated by Mr. Revere, is . . | $314,680.00 |
| Value of goods and supplies on hand . | 206,132.00 |
| Net value of shipping ore on hand . . | 184,248.00 |
| " " fines or low grade ore at Little Bay | 148,940.00 |
| Assets, irrespective of value of the working mines and real estate . . . | $854,000.00 |

There are to be deducted from this 1,600 tons of ore, worth about $30,000 in Swansea, to which the Betts Cove Company is entitled.

## LETTER OF FRANCIS ELLERSHAUSEN.

*To the Directors of the Newfoundland Consolidated Copper Mining Company:*

GENTLEMEN: Permit me to address to you a few lines upon the character of the proceedings of our mining adventure in Newfoundland. So far it only can be called the initiation of a mining industry in that country. Our mining district is situated over two hundred miles distant from St. Johns, and was in an entirely unbroken country, with no roads or direct means of communication of any sort, except by vessels especially chartered, and during four months of the year we would have been entirely cut off from all communication had we not employed Indians as mail carriers. Now we have succeeded in getting mail steamers to call at our ports, and Government mail carriers during the winter. We also have telegraphic communication between the various mines and St. Johns since two years. The only inhabitants in this district were a few fishermen; therefore we had to import laborers of every description from England and America at an enormous expense. Now thousands of young fishermen have been trained as miners and other skilled laborers, who are quite equal in point of workmanship to our former laborers, and who, at the same time, work for nearly 50 per cent. less.

Our shipping ports were entirely unknown to the maritime world, and therefore great inducements had to be given to obtain sufficient tonnage for our requirements, and steamers could only be obtained by giving time charters; now Liverpool lines of steamers are competing for our trade, no longer on time charters, but on freight per ton, which is nearly a difference of 50 per cent. less. Our Company did not start with a ready working capital in hand, as many other companies do, but worked its way up with nothing in hand to its present magnitude by applying all the proceeds to a series of advancements, by prospecting and developing, not only one mine, but a

whole mining district, as you must feel convinced from the reports of the experts. Still in the face of the above-mentioned difficulties, which now have been overcome, we would have paid over one million two hundred and fifty thousand dollars of dividends during the six years of operation, if the amount spent for the manifold improvements had been drawn from a paid-up working capital; but that you may understand more fully the history and financial condition of our concern, I may state, in 1874 I started on my own account the Betts Cove Mine, but soon after entered into partnership with some other gentlemen.

In Nov., 1878, we formed a company, limited, but with the understanding that no shares should be sold to outsiders beyond the number of shareholders required to constitute a limited Company. £200,000 sterling of stock were divided amongst us as fully paid-up shares, which shares represented at that time the actual outlay, being money earned by the mines less the sum of £30,000 sterling advanced by one of the partners; since then the policy of still enlarging the concern by making improvements and developing new mines has been continued, and therefore no dividends have been declared. Considering that the works are now in a good condition, and a cheap labor market being established, it may easily be seen that in future large net earnings can be divided, and particularly so, as the Robert's Arm Mine, which was my personal venture, described in the reports, has been added to the other properties. The statements will, I think, give you all the information you desire. I might have stated the number of tons of copper ore mined and amount of wages to employés, but the various reports in your hands give you that information, as well as to the probable output and expected net profits of the future operations. I may call your attention the fact that your company not only takes the property without one dollar of incumbrance upon it, but on the contrary, with stores, supplies for the mining population, and a large amount of copper ore on hand, of a net value of over $500,000 in all.

I have no hesitation, therefore, in stating that in my

judgment the net profits of the mines should be at least $300,000 per annum, based on the price of copper at 11s. 6d. per unit, which is much below the average price that copper has sold at for 10 years past.

Before concluding, I beg to call your attention to what I consider, from my experience, should be the character of your future operations. As the mines being wrought are numerous, and capable of producing a larger output at less expense than formerly, you might feel induced to increase shipments much beyond from 30,000 to 40,000 tons per annum, but this I do not consider advisable. You can smelt to a matte as cheaply at the mines as they do in Swansea, because fuel comes out from England as ballast, and wages are actually cheaper in Newfoundland than in Swansea. With this object in view, we erected a few cupola furnaces, and smelted during last year with great success, and now we have started the erection of smelting works with a capacity of 100 tons per day. The necessary material, with the exception of the machinery for blast, is now on the ground. I would again refer you to Mr. Revere's report, in which he shows the advantages of smelting. I also beg to direct your attention to a suggestion which I think is worthy of your consideration. You find from description in the reports of the Hall's Bay district, that there are quite a number of localities, which, in all probabilities, will become large producers of ore.

During the last three years we have been prospecting and sinking shafts in that district, with an average force of fifty men, but beyond half a dozen houses, a supplying store, and a wharf, no further equipments have been made. To complete the plant for that district would entail an outlay of from $300,000 to $400,000. It appears to me to be a pity that these valuable properties should remain unworked, but also equally unwise if the net earnings of the other mines should again be spent for further enlargements of the concern; therefore, I advise that either a part of the Treasury Shares of the company should be sold and the proceeds applied for the completion of the plant of the Hall's Bay Mines, or that this

district should be sold to another company and the proceeds, whether in cash or shares, divided amongst the shareholders of your company. I am, dear sirs, yours truly,

FRANCIS ELLERSHAUSEN.

NEW-YORK, Jan. 25, 1881.

*To the Directors of the Newfoundland Consolidated Copper Mining Company.*

GENTLEMEN: The counsel of your Company, Whiteway & Johnson, Esquires, of St. John, Newfoundland, have certified that the Company's titles to its mining properties are in all cases good, in their opinion. We have examined the documents showing chain of title, and the abstract, and are of opinion that the titles are perfectly good.

Respectfully yours, DAVENPORT & LEEDS.

## REPORT OF JOSEPH W. REVERE, ESQ., M. E.

NEW YORK, January 19, 1881.

*To the Directors of the Newfoundland Consolidated Copper Mining Company:*

I respectfully submit the following report on some of the different mines of your company, which were examined by me during the months of July and August, 1880.

Mining of copper ores in Newfoundland was first begun at Tilt Cove, in 1865. This property is fifteen miles east of Betts Cove, and is still worked by one of its original owners, a Mr. Bennett, of St. John. Work was begun at Betts Cove in the autumn of 1874, by Mr. Francis Ellershausen, and since then, under his management, have been opened properties at Little Bay, Southwest Arm, Hall's Bay and Robert's Arm.

The properties of your company are situated on the west side of Notre Dame Bay, which is on the north-east coast

of Newfoundland, and 230 miles north of St. John, the capital of the island. The shore of this bay is very high and rocky, the cliffs in many places rising to the height of 300 feet above the sea level. Many deep little arms run inland from the main bay and form excellent harbors for the largest vessels. The surrounding country is heavily wooded with spruce and birch.

The copper veins and deposits are found in the rocks belonging to the lower Silurian magnesian system. The gangue of the ore beds or deposits being chlorite slate, and the country rocks for the most part a hard diorite. The copper ore is in the form of a yellow sulphuret, and is distributed in veins and seams through the slate. These seams vary from a fraction of an inch to many feet in width. The ore itself is especially free from all impurities, and with slight hand picking, can be brought up to a merchantable article, running from eight to sixteen per cent. of metallic copper. The production of first-class ore is at present all shipped to England and there sold to the smelters. The lower grades, or ore mixed with gangues so as to require much labor or machinery to separate it, are for the most part thrown upon the dumps. But at one of the mines the lower grade ores are part of them smelted to produce a low regulus.

## MINING LAWS OF NEWFOUNDLAND.

Any British subject can claim, on lands not already granted, a right of search for minerals over an area of three square miles on payment of £5. Within two years of obtaining it he must select from these one square mile in any rectangular form, provided it be not less than half a mile wide, which, on the payment of £10 and government expenses, is given as a grant. The other two square miles lapse to the government, who, at one time or another, will sell them by auction. If on a grant the grantee should expend a sum of not less than £4,000 within eleven years, it becomes his absolute property in perpetuity in fee simple.

Aliens, as individuals, cannot hold property in Newfoundland, but only as a body corporated, with the one condition that two directors or trustees of said body must be subjects of the crown.

Your company is now working five different properties, namely: the Betts Cove Mine, Southwest Arm Mine, Little Bay Mine, Hall's Bay Mine, and Robert's Arm Mine. They are all worked on leases, the original lessees having procured grants or rights of search from the government.

The leases and grants controlled by your company are as follows:

Betts Cove, 2 grants; Burton's Pond, 1 grant; Southwest Arm, 2 grants and 2 leases; Little Bay, 4 leases; Hall's Bay, 4 leases; Robert's Arm, 11 leases; Seal Bay, 1 lease.

The mines which I examined were Betts Cove, Little Bay, Whale's Back, which is a portion of the Little Bay property, Southwest Arm, Hall's Bay, and Robert's Arm.

## BETTS COVE MINE.

This mine is located on very high ground, three-quarters of a mile west from an arm of the sea called Betts Cove. Mining operations were begun here in the autumn of 1874, and have been pushed with more or less energy since that time, the result being that, since the spring of 1875, 110,000 tons of copper ore have been shipped to England. The ore is found distributed in large veins through an immense bed of chlorite slate. This slate has a well-defined strike east and west, with a perpendicular north wall of diorite. Another wall has not been found under-ground, although the slate bed has been prospected 150 feet in width. Distributed through this slate bed are detached masses of diorite, and surrounding these the ore seams increase in size and richness. The slate bed has been worked to the depth of 400 feet; in width, 65 feet, and in length, 625 feet, with shipping ore in sight in each direction. The mine at the

present is worked through a perpendicular shaft 165 feet deep. The lower portion of the mine being approached from that level by an incline and several winzes.

Thus far all the mineral has been removed by underhand stoping, leaving occasional floors and pillars. At the time of inspection, the bottom of the mine could not be seen on account of the accumulation of water, brought about by the removal of the pumping and hoisting machinery to the present shaft. The daily flow of water in the mine is not large, as four hours' pumping out of the twenty-four will keep it clear. In the breasts of the upper workings good seams of ore are in sight, especially in a drift 400 feet east from the main shaft. An estimate of the amount of No. 1 ore in sight, in floors and pillars, gave over 40,000 tons. All this can be made available without injury to the development of the mine, or to the maintenance of the present product, which is over 650 tons of shipping ore per month.

The working shaft is well timbered and fitted with cage hoist. The hoisting engine, pump, air compressor for three drills, are in perfect condition and in a suitable building. The other surface machinery consists of a large rotary washer and screen and two power jigs for concentrating the fine ore. Steam is supplied by one tubular and two flue boilers. Near the mine is the machine shop, foundry, and forge of the Betts Cove Mining Co. Here all the iron work and repairs for the different mines are made, and the capacity of this branch is truly wonderful. Everything in the shape of iron work is done, from the forging of the smallest bolt to the building of a large double acting air compressor, the latter having been built here last winter for the Little Bay Mine. The mine is connected with the wharves at Betts Cove, three-quarters of a mile distant, by a double tracked tramway and two inclines, one of 1,000 feet and the other of 600 feet in length. These both are fitted with brake houses, wire rope, etc. The tramway and inclines are built on trestle work, above snow level, and are laid with 60-lb. iron rails. The cars are of the English mining pattern, and have a capacity of two and a quarter tons each of ore. At

the present time, 130 men and boys are employed in and about this mine.

Betts Cove is a deep arm of the sea, three-quarters of a mile in length. The upper end of it is protected by a breakwater, and is lined with wharves and storehouses. There is room for two ocean steamers and several sailing vessels to load at the same time. On the eastern side of the harbor a stream of water pours down through a slight break in the cliffs. This is the outlet of a large pond which has an elevation of 200 feet above the sea. At a comparatively small cost, this could be made to furnish 300 H. P. for air compressors, etc. North-east, upon the high land above the cove, are strong indications of a bed of copper-bearing slate, and a tunnel is now being run (on contract) from the head of the cove to prospect it. The manager's house, company store, office, church, hospital, laboratory, nine storehouses, and telegraph are located at the harbor, and between here and the mine are 160 dwelling houses for work people. These are all in good condition.

## SOUTHWEST ARM.

This property is located three-quarters of a mile south of S. W. Arm, which is a deep bay 18 miles west of Betts Cove. The land rises abruptly on both sides of this bay, to the height of 300 feet, and is well wooded. The formation is more regular than at Betts Cove, and does not seem to have been so much disturbed. Work was begun here in the autumn of 1878. The contour of the surface would indicate that the bed of mineralized slate extended two-thirds of a mile east and west, and was seventy yards in width. There are several other locations on the property where prospecting has developed beds of mineral, but as yet no great amount of work has been done upon them. Surface prospecting is difficult, owing to the deposit of decomposed vegetable matter that overlays the rock formation. Two shafts are being sunk next to the southern wall of the slate bed. This wall is of diorite, and dips slightly to the south.

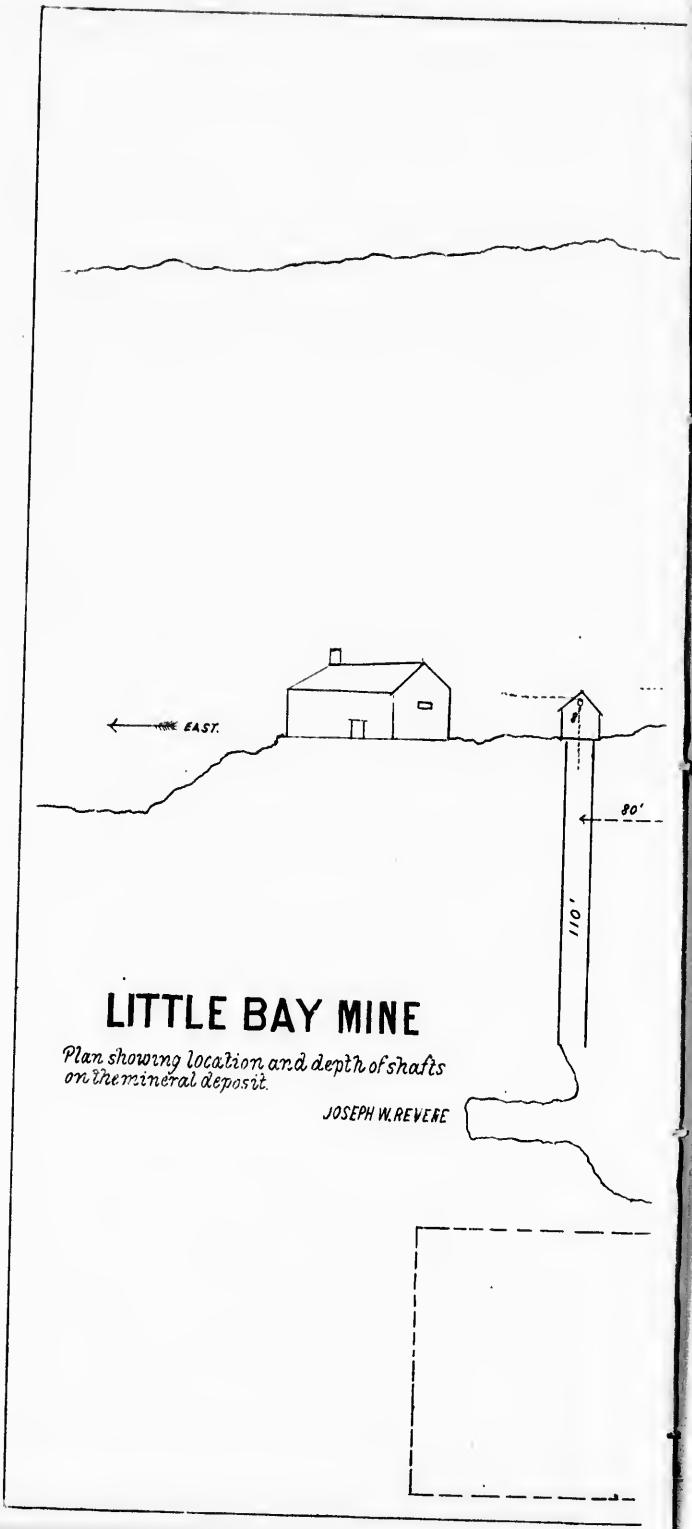
The main shaft is down 145 feet, with several short drifts running from it. Two seams of ore are penetrated by this work, each two feet in width and five feet apart. 300 feet east of this shaft the other is being sunk. It is now down 90 feet, and producing ore in paying quantities. The shafts are both worked by horse whims. The work done here had, up to the time of my inspection, produced 1,100 tons of shipping ore, 900 tons of which had been sent to Swansea. The mine is connected with the high shore of S. W. Arm, by a good wagon road, and from this point a fine double-tracked incline, 800 feet in length, runs down to the wharf. On the shore at the head of the wharf are the manager's house, store, and storehouse. At the present time, 35 men and boys are employed on this property.

## LITTLE BAY MINE.

This property is located on a high peninsula between Indian Bight and Little Bay. It is 15 miles south-west from Betts Cove and 12 miles south-east of S. W. Arm. Mining was begun here in the summer of 1878, and has been carried on with great vigor since that time. The copper ore is found in the same chlorite slate as at Betts Cove and S. W. Arm. The surface indications of an immense mineral deposit were very marked, a cropping of mundic and copper pyrites being exposed for 1,000 feet on the strike of the slate bed. The course of the slate bed is east and west, and extends two-thirds of a mile west of the present workings. On the south a ridge of hills composed of the country rock (diorite) rise abruptly to the height of 200 feet. Underground this diorite forms the southern wall of the slate bed. When the property was first opened, several thousand tons of ore were taken out near the surface where the outcrop was uncovered. Then 8 shafts were started, from 80 to 150 feet apart, on the strike of the bed. By means of these a system of underhand stoping, leaving occasional floors, has been followed. The stope is 35 feet in width, and at the bottom of shafts Nos. 5 and 6 is in solid ore, requiring hardly any picking before

shipment. East and west drifts are being run at the depth of 200 feet to open new ground, and they are all producing good ore. Masses of diorite occur in places through the slate bed, but are not of great extent, and are always surrounded by bodies of rich ore. North of the stopes the bed has been prospected 160 feet, and seams of ore found the whole distance. At this point the conformation of the surface would indicate that a north wall would not be found short of 300 feet from the line of shafts. The monthly production of shipping ore is 3,000 tons.

By the erection of additional hoisting machinery the production can easily be doubled. The hoisting from shafts Nos. 6 and 7 is done by a double cylinder, 80 H. P. engine, and from No. 5 by a 40 H. P. engine. There is but little water in the mine, and this is taken out in the buckets. The rock and ore is first broken and picked by hand on a large floor at the mouth of the shafts. Two-thirds of all the ore brought to the surface is No. 1, 8 per ct. copper. The waste rock goes to the dump. The mixed ore and fines, which require more careful separation, are conveyed to the wash house. Here are screens and two large rotary washing cylinders. The rock is passed through these, and the No. 1 ore is picked out. The dumps are all overhauled by contract for No. 1 ore. In fact all picking and sorting of the ore is done by contract at a very low figure. Of course immense dumps of rock and fines, containing considerable ore, have accumulated near the mine and wash house. The mine is connected with the wash house, the smelting works, and the wharf at Little Bay, by a tramway and incline of 4,600 feet in length. This is well built and laid with 60-lb. rails. The cars are like those used at Betts Cove, and are drawn up the grade by horses. On the line of the tramway are many of the laborers' houses; these all belong to the company and are in good condition. The smelting works are upon an elevation near the wharf, and contain three Welch matting furnaces. These are run on the lower grade ores, and can reduce 10 tons each in 24 hours. Between the smelting works and the mine are two ponds, which



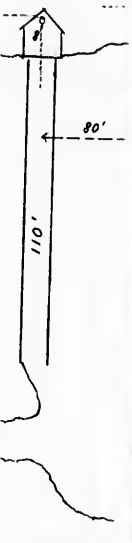

# LITTLE BAY MINE

*Plan showing location and depth of shafts on the mineral deposit.*

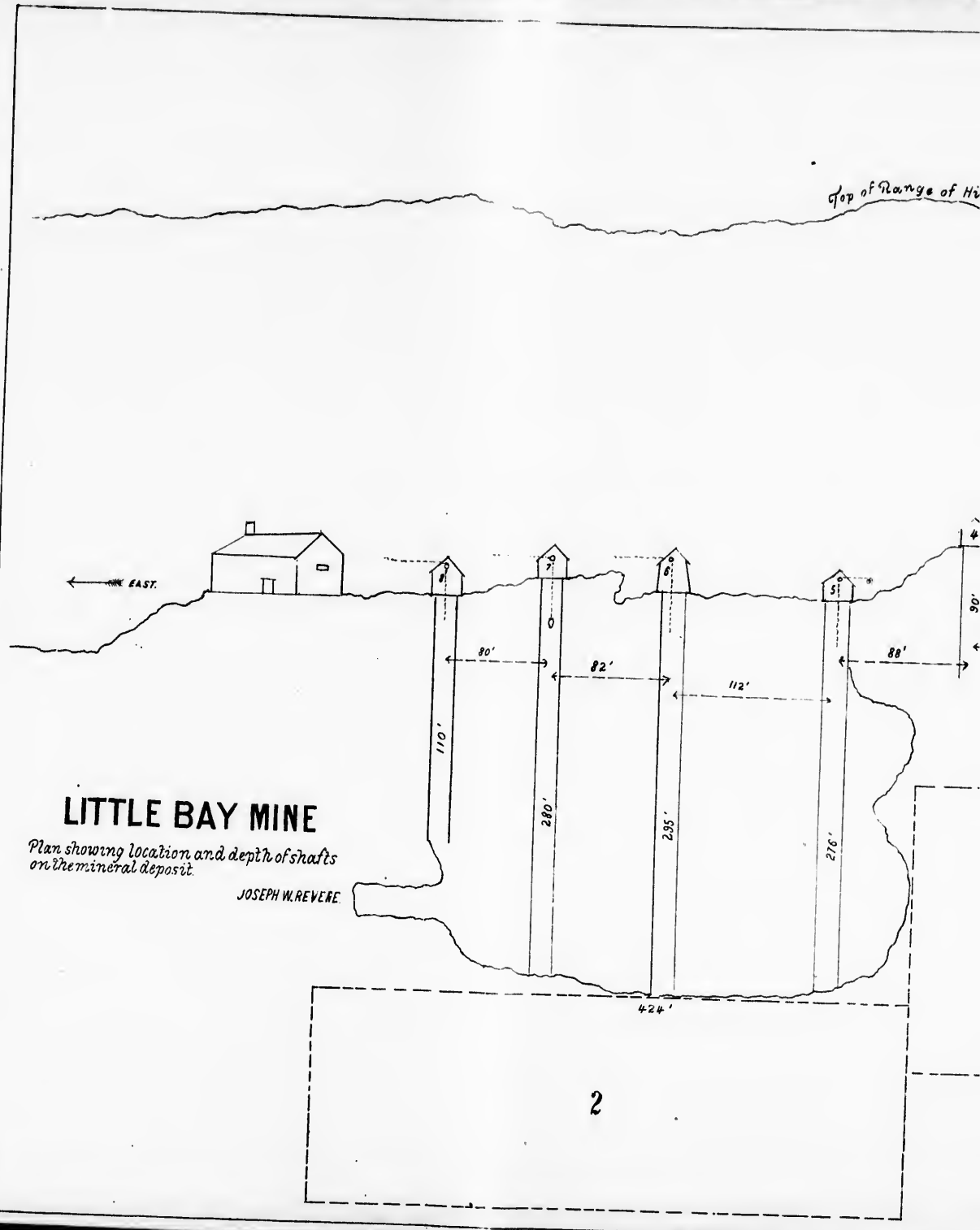
JOSEPH W. REVERE

would supply plenty of water for concentrating works and improved water jacket furnaces. The wharf is well built, and has frontage enough for the largest ocean steamers. It is supplied with good loading stages, tracks, &c. Little Bay is almost landlocked, and forms a fine harbor. At the head of the wharf is a dump for the shipping ore. At the time of the inspection there were 3,000 tons of ore upon it, and a large iron steamer was discharging coal at the wharf. At the head of Indian Bight, one-half a mile north of the Little Bay mine, is the principal town. Here is the manager's house, the store, local offices, post office, telegraph, church, and miners' houses. There is also a good wharf where the mail steamers land.

I attach a plan of the Shafts on the Little Bay property. The plan shows the 8 shafts sunk on the strike of the deposit.



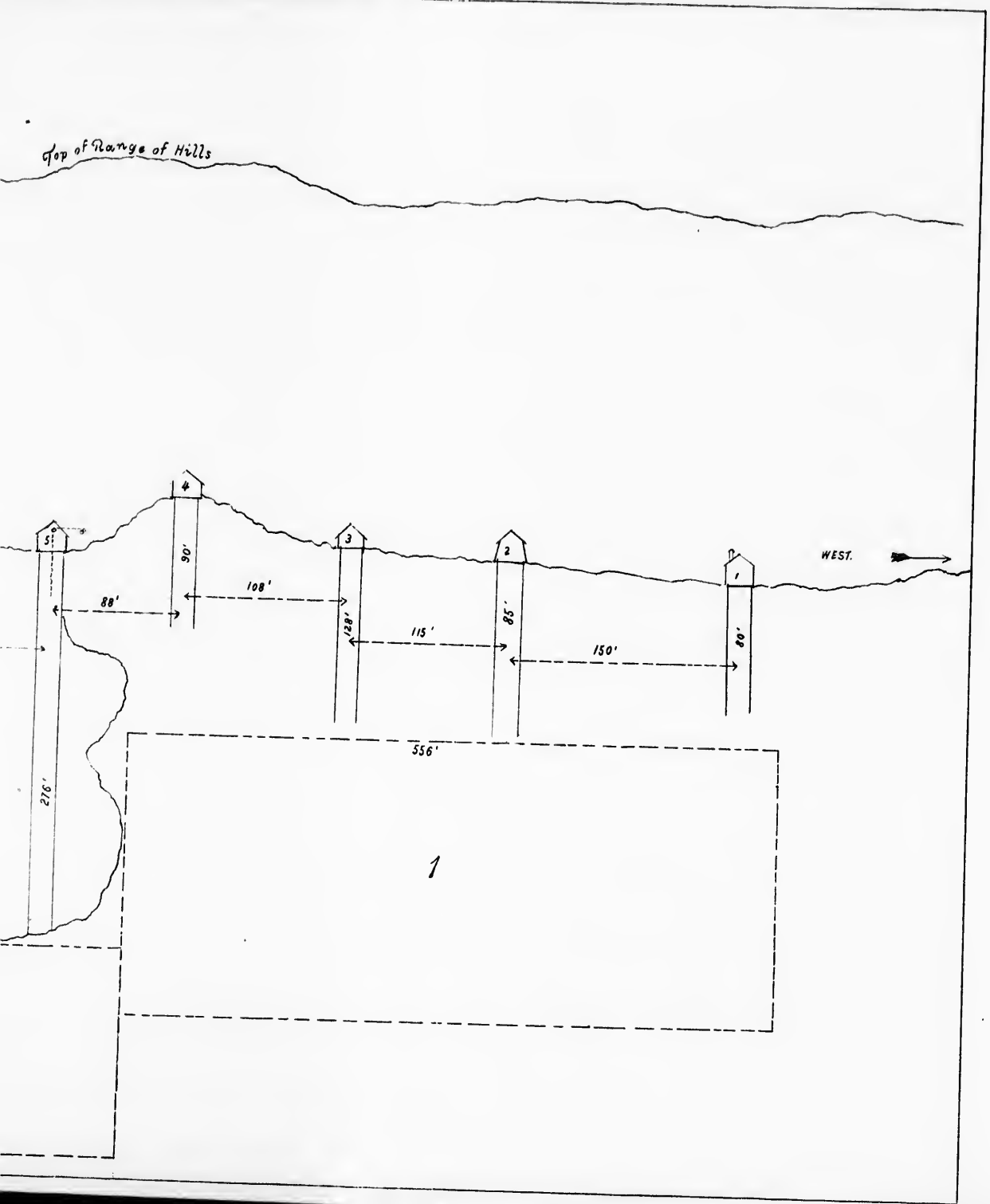

Those marked 5—6—7 are the ones from which most of the product was being taken at the time of my inspection. At No. 2 (Frenchman's) the deposit is now dipping into the hill towards the south. The principal Stopes at Nos. 5—6—7 are about 35 feet wide from the south wall of the deposit. North of these Stopes the deposit has been prospected about 160 feet and ore found the whole distance. As there is no reason to suppose that the deposit does not extend many hundred feet below the present workings, and the Sulphurets having increased in density and richness as a greater depth has been attained, I calculate that the blocks of ground marked by *dotted* lines will yield at least 200,000 tons of marketable ore. Then as the ground on the extension of the deposit east and west of the line of shafts is equally rich and known to extend a long distance, I consider it safe to say that the Mine is capable of producing in the future at least 250,000 tons of marketable ore, which may fairly be considered as the amount of present reserves. It is impossible to calculate the exact extent of this wonderful deposit of Copper Sulphurets, but it is undoubtedly to-day one of the largest ever opened, and is likely to last for years to come.




# LITTLE BAY MINE

Plan showing location and depth of shafts on the mineral deposit.

JOSEPH W. REVERE.


Top of Range of Hills
WEST.
5
4
3
2
1
88'
90'
108'
128'
115'
85'
150'
80'
276'
556'
1

## WHALE'S BACK.

This is a new location, 2½ miles west, and inland from the Little Bay mine. It was only discovered a few months since, and thus far the only work done upon it has been to ditch and prospect the surface. But this alone has demonstrated that there is an enormous bed of copper-bearing slate on the property. It has been uncovered at intervals of 200 yards in length and 100 yards in width, and wherever the slate has been exposed, it contains seams of copper sulphurets. In any other locality this would be looked upon as the prospect for a large mine, and in many respects the surface showing is superior to that at Betts Cove and Little Bay. The country is quite hilly, and covered with timber suitable for building and mining purposes. There is a good grade for tramway or road to the shore of Little Bay, 1½ miles distance, where the shipping point would have to be.

## HALL'S BAY.

This is a district by itself, 3 miles west and inland from the head of Little Bay. Copper ore was first discovered in 1878, but little work has been done upon it until within the present year. The country is heavily wooded, and the soil quite deep, so that prospecting is carried on with great difficulty. But where work has been done, very flattering results have been obtained. The formation is the same as at Little Bay and Whale's Back. Beds of chlorite slate, with seams of copper sulphurets, and the country rock of hard diorite. Five different localities are worthy of special mention, but mineral has been found in many other places, and only lacks development.

LADY POND.—Here only a few prospect holes have been opened, but they all show mineral. At one point near the pond, copper sulphurets crop above the surface for many yards. This is now being thoroughly opened. Near this is also a 6-inch vein of peacock copper, but as the formation is much disturbed, its value is questionable.

COPPER HILL.—A number of prospect holes and ditches have been sunk at this point, and they all show mineral in slate. The southern boundary of this bed is well marked by a high ridge of the country rock.

NO. 1, NEW MINE.—This is a well-defined bed of slate, carrying strong seams of copper sulphurets. Its width is 300 feet, and it has been prospected for 1½ miles east and west. On the north side of this bed a shaft is being sunk; it is now down 90 feet, and has been in ore from the surface. At the depth of 60 feet a crosscut is being driven in ore, and is now in 30 feet. In sinking and driving there have been taken out 100 tons of first-class ore. The sulphurets from this bed are especially rich, and easily pick to 15 per cent. copper.

SAW PIT.—At this point a shaft is down 30 feet in a slate formation, at the foot of a high hill, and ore enough is taken out in sinking to pay all expenses.

OLD MINES.—Considerable work was done here, principally drifting, when the district was first discovered, in 1878, and some ore produced, but during the past year no work has been done. Were there not so many more attractive prospects in the district, this would be looked upon as worth opening.

On the shore of Hall's Bay a wharf is almost completed. Here, also, is the manager's house, store, and about 100 tons of ore waiting shipment. The Hall's Bay district is destined to have a brilliant future, and produce some large mines. The present work should be carried on until another year, and then a tramway built to tide-water on Hall's Bay. There is an abundance of timber and water on the property.

## ROBERT'S ARM MINE.

This mine is 15 miles south of the Little Bay mine, and about 1¾ miles from Robert's Arm or Inlet. The surface of the country is covered with timber suitable for mining or

building purposes, and for fuel. The mine is situated on the north shore of a large fresh-water pond, from which it can command ample water power, about 130 feet above the sea level. There is found here much the same formation of the country rock as at Hall's Bay, Little Bay, etc., but the copper sulphurets are found in a true fissure vein of great strength. One-quarter of a mile south of the main workings a shaft has been sunk 64 feet on a 12-inch vein of yellow sulphuret mixed with copper glance. Three-quarters of a mile west a shaft is down 14 feet on a 4-foot vein of quartz, carrying 12 inches of yellow sulphuret mixed with galena. Both of these are on different veins from the one first described.

Up to the time of my inspection, there had been raised in all from this property 700 tons of 12 per cent. ore and 1,000 tons of lower grade. Further exploration should be made east and west of the present workings, the indications being extremely favorable. And there is also every reason to suppose that there are other veins parallel to the one worked at present. This is indeed a most valuable property, and the question of its permanency is beyond doubt.

At the head of the pond before mentioned, there has been built a mill for concentrating the lower grade ores. This mill contains 15 head of stamps and 2 rotary pulverizers. All that is required to put it in running order are a few jigs for separating the crushed ore. Power is supplied to the mill by a 200-horse-power turbine wheel, taking water from a river through a fine flume 400 feet long. The rock and ore can be transported to the mill by water in large scows.

The mine is connected with the wharf at Robert's Arm by a tramway built on trestle work, above snow level. Near the wharf are the manager's house, store, etc. The harbor is a fine one, and almost landlocked. For a more detailed description of this property, I refer to the able report made by T. Sopwith, in January, 1880.

## MANAGEMENT.

Each of the different mines described has its own local manager, office, store, &c. This is necessary, as they are separated from each other by at least 15 miles, and the only communication is by water. Little Bay, Betts Cove, and South West Arm are connected by telegraph with each other, and with St. John and the Atlantic cable.

The company employ two surgeons, and have a hospital at Betts Cove. A magistrate and police are provided by the Government of the Island. From the opening of navigation in the spring until the 1st of January, the mails are brought by a steamer from St. John every ten days. During the winter they are brought overland by sledge.

## SUPPLIES.

This portion of Newfoundland being so isolated, the question of supplies is important. Most of the mining goods are brought from England, but the provisions and store goods come from the United States and Canada. The Betts Cove Mining Co. carry on all the stores, and in the course of a year sell about $200,000 worth of goods, at a profit of 25 per cent., which is equivalent to a discount of that amount upon the wages paid.

## LABOR.

This can be obtained in any required quantity, and the physical standard of the workmen surpasses that of the average Cornish miner. The wages now paid average from 90 cents for ordinary laborers to $1.50 for skilled miners. Wages are not likely to increase, as the supply of labor on the island far exceeds the demand. A single man can live for about $10 per month, and a family for $18.

## LUMBER, FUEL, &c.

Mining timber is abundant.

| | |
|---|---|
| Large stulls, 16 ft. by 18 in. . . | $1 each. |
| Lagging poles, 16 ft. long . . | 5 cents each. |

| | |
|---|---|
| Sawed lumber | $14 per M. |
| Firewood | $1 per cord. |
| Charcoal | 6 cents per bushel. |
| Coals | $2 per ton. |
| Coke | $4 per ton. |

Coals and coke are brought as ballast by steamers coming for ore cargoes.

The ores melted at Little Bay are low grade, picked from the richer ores and the dumps. The dumps are very extensive, the most of the rock in them being chlorite slate, charged with sulphurets, and will assay about 4 per cent. copper. They are put into the furnaces without being roasted, to liberate a portion of the sulphur, and but little attention is paid to a proper mixture of ores and fluxes. The furnaces are poorly constructed, and of small capacity. Still a profit is made on smelting. As Little Bay is the largest producer of these low grade ores, and also a central point in the district, it would be the best place to erect extensive smelting works. Blast furnaces of the most improved American pattern should be built, the ores roasted in heaps, and then smelted with the more silicious ores from Robert's Arm. A careful estimate of the cost of smelting works to treat 2,000 tons per month shows that they could be built for $12,000.

Estimated cost of reduction to a 20 per cent. regulus, of 2,000 tons 5 per cent. ore:

| | | |
|---|---|---|
| Picking from dumps and roasting, $2 per ton | $4,000 | |
| Smelting, $2.75 per ton | 5,500 | |
| Freight and sale of 450 tons regulus | 3,217 | |
| | $12,717 | |
| Royalty | 720 | |
| | | $13,437 |
| Value of 450 tons of 20 per cent. regulus in England | | 24,750 |
| Leaving a profit of | | $11,313 |

Assays of ore samples taken in the different mines:

| | | |
|---|---|---|
| Little Bay, taken at random in the ore bed | $17\frac{5}{10}$ | per ct. copper. |
| Betts Cove | $23\frac{4}{10}$ | " |
| Hall's Bay, from No. 1, new mine | $25\frac{5}{10}$ | " |
| South West Arm, from both veins | $18\frac{6}{10}$ | " |
| Robert's Arm, picked ore from main vein, | $28\frac{2}{10}$ | " |

These assays are given to show that the ores can be picked to a much higher grade than they are at present.

Cost of production of shipping ores, per ton:

| | |
|---|---|
| Little Bay, 8 per ct. copper, landed on wharf | $7.82 |
| Betts Cove, 10 per ct. " " | 9.42 |
| Robert's Arm, 12 per ct. " " | 10.00 |

## SHIPMENT OF ORES.

Ore can be shipped by steamer or sailing vessel during eight months of the year, the other four months the harbors are closed by the drift ice from the north. Shipments are made either to Swansea or Liverpool, where they are crushed and sampled. At present, none of the ores are sampled at the mines, but are shipped as they come from the ore floors.

The rate of freight from the mines to England, is for steamers 19*s.*, and sailing vessels 15*s.* per ton.

## COST OF MARKETING ORES.

| | | |
|---|---|---|
| Freight by steamer | 19*s.* | $4.56 |
| Sampling, crushing, &c. | 1*s.* 6*d.* | .36 |
| Change into tons of 21 cwt. | 7*s.* | 1.68 |
| Insurance | 1*s.* 6*d.* | .36 |
| Commission ½ per cent. on value | 5*d.* | .10 |
| Harbor dues | 4½*d.* | .09 |
| Per ton, | | $7.15 |

The Newfoundland copper ores will always find a ready market at the English smelting works, as they contain elements that act as fluxes on ores imported from many other localities. They cannot at present be brought to the United States, because of the tariff imposed upon foreign ores; but should this be removed, a large market would be opened here.

Highest and lowest prices of copper ores and regulus in the Swansea market, during the past three years:

| 1879. | 1878. | 1877. |
|---|---|---|
| 14*s.*——10*s.* 6*d.* | 13*s.*——11*s.* | 14*s.* 9*d.*——12*s.* per unit. |

Swansea prices of ores and regulus on the first day of each year during the past ten years:

| | | |
|---|---|---|
| 1871 | 12*s.* | per unit. |
| 1872 | 17*s.* | " " |
| 1873 | 18*s.* | " " |
| 1874 | 16*s.* 6*d.* | " " |
| 1875 | 16*s.* 9*d.* | " " |
| 1876 | 17*s.* | " " |
| 1877 | 15*s.* 6*d.* | " " |
| 1878 | 13*s.* 3*d.* | " " |
| 1879 | 11*s.* 6*d.* | " " |
| 1880 | 14*s.* | " " |

The value of ores given in the report are calculated at 11*s.* 6*d.* per unit, which is below the average price of copper for the past ten years.

Present monthly production of Betts Cove and Little Bay mines:

| | | | |
|---|---|---|---|
| Betts Cove, 650 tons of 10 per cent. copper ore | | $17,875 | |
| Cost of mining | $6,123 | | |
| Freight and sale | 4,647 | | |
| Royalty, 2*s.* per ton | 312 | | |
| | | $11,082 | |
| | | | $6,793 |

| | | | |
|---|---|---|---|
| Little Bay, 3,000 tons of 8 per cent. copper ore | | $66,000 | |
| Cost of mining | $23,460 | | |
| Freight and sale | 21,450 | | |
| Royalty, 4*d.* per unit | 1,840 | | |
| | | $46,750 | |
| | | | $19,250 |
| Profit for one month | | | $26,043 |
| Profit for one year | | | $316,516 |
| 25 per cent. profit on $180,000 of store goods sold | | | 45,000 |
| Total profit on both mines | | | $361,516 |

The amount of ore produced from all the mines in 1880 was over 30,000 tons, and there is no reason that with the present outlook at Little Bay, and the new development at Hall's Bay and Whale's Back, another year this production should not be doubled, if desired.

ESTIMATED VALUE OF PLANT, SEPT. 1, 1880.

| | | |
|---|---|---|
| Betts Cove mine | £32,583 | |
| Southwest Arm mine | 1,843 | |
| Little Bay | 21,982 | |
| Hall's Bay | 128 | |
| Robert's Arm | 6,400 | |
| | £62,936 | |
| | | $314,680 |

This estimate does not include supplies not in use, stocks in stores, or value of the mines.

This plant originally cost over $500,000.

ORES ON HAND READY TO SHIP, SEPT. 1, 1880.

| | | |
|---|---|---|
| S. West Arm, 200 tons, 11 per cent. copper, | $6,050 | |
| Hall's Bay, 200 tons, 12 per cent. copper, | 6,600 | |
| Robert's Arm, 700 tons, 12 per cent. copper, | 23,100 | |
| Little Bay, 3,000 tons, 8 per cent. copper, | 66,000 | |
| | $101,750 | |
| Royalty, freight and sale . . . . | 32,487 | |
| | | $69,263 |

Estimated value of fines at Little Bay, 40,000 tons concentrated to 14,000 tons of 8 per cent. copper:

| | | |
|---|---|---|
| \ . . . . . | $308,000 | |
| Cost of concentration . . | $50,000 | |
| Freight, royalty and sale . . | 109,060 | |
| | $159,060 | |
| Actual value . . . . . | | $148,940 |

SUPPLIES ON HAND.

| | |
|---|---|
| Stocks in stores at Betts Cove, Little Bay, Southwest Arm and Hall's Bay . . . | $140,705 |
| Supplies, stocks in stores at Robert's Arm . . | 7,000 |
| Yours, respectfully, | $680,588 |

JOSEPH W. REVERE, M. E.

NEW YORK, Jan. 21st, 1881.

*To the Board of Directors of the Newfoundland C. C. M. Co.*

GENTLEMEN: I enclose with this an estimate of the value of goods, supplies, and shipping ore on hand at the mines at the present time. My figures are based on official information received within the past few days.

I remain, yours respectfully,

JOSEPH W. REVERE, M. E.

Goods and supplies on hand, Jan. 21st, 1881:

| | |
|---|---|
| Betts Cove | £24,760 currency. |
| Little Bay | 20,000 |
| S. W. Arm | 1,922 |
| Robert's Arm | 3,000 |
| Hall's Bay | 1,851 |
| | £51,533 = $206,132 |

Marketable Ore:

| | |
|---|---|
| Little Bay | 7,500 tons. |
| Robert's Arm | 1,000 " |
| Betts Cove | 1,250 " |
| S. W. Arm | 150 " |
| Hall's Bay | 120 " |
| | 10,020 tons. |

| | |
|---|---|
| Value in Swansea at present prices after deducting royalty, freight, sale, etc. | $184,248 |
| Value of fines at Little Bay, as per report | 148,940 |
| | $539,320 |

## REPORT OF T. SOPWITH.

6 Great George Street, Westminster, S. W.,
5th January, 1880.

*Messieurs The Newfoundland Minerals Company, limited.*

GENTLEMEN:

### ROBERT'S ARM MINE.

I beg your acceptance of the following report upon this mine, which was inspected in accordance with your instructions in November last.

POSITION.—The mine is on the west side of Notre Dame Bay, on the east coast of Newfoundland, about 2 miles from Robert's Arm Bight or Inlet. It is 250 miles north of St. John, the capital of the island.

TOPOGRAPHICAL AND GEOLOGICAL CONDITIONS.—The surface of the adjoining country is densely covered with timber and underwood, suitable for building and mining purposes and for fuel. The mine is situated on the north shore of a large fresh-water lake, from which it can command ample water power, about 130 feet above sea-level.

The copper vein and deposits are found in the rocks belonging to the lower Silurian magnesian system; the general characteristics of which at Robert's Arm are identical with those of Tilt Cove, Betts Cove, Little Bay, and other mines successfully worked on the opposite shore of Notre Dame Bay, the two last named by the vendor of Robert's Arm mine.

These copper bearing rocks extend and are worked still further south of Robert's Arm, and the district is even now, perhaps, one of the most important in its copper production known at the present time, and is capable of still greater development.

The Robert's Arm mine is on a true vein of great strength, with marked indications of great mineral wealth. It dips south at an angle of 34 degrees, is three feet thick at surface, and increases to 15 feet, at a depth of 100 feet. The principal matrix is quartz, intermixed in places with chloritic slate, and the foot-wall carries a fine leader of rich, yellow copper.

The direction of the vein is east and west, and there are indications of other veins in the immediate vicinity. Shortly previous to the inspection on which this report is based, a discovery was made of a promising vein about a quarter of a mile to the south of the principal and only one on which any explorations have been made.

## MINING LAW OF NEWFOUNDLAND.

This has been drawn up in a liberal spirit, and is well calculated to develop the mining resources of the country; the effect of a liberal policy is seen in the gigantic strides of the mining industry within the last 10 years.

Any British subject can claim on lands not already granted a right of search for minerals over an area of 3 square miles on payment of £5. Within 2 years of obtaining it he must select from these one square mile in any rectangular form, provided it be not less than half a mile wide, which, on payment of £10 and government expenses, is given as a grant. The other two square miles lapse to Government, who at one time or another will sell them by auction.

If on a Grant the concessionaire should expend a sum of not less than £4,000 within 11 years, it becomes his absolute property in perpetuity in fee simple.

At Robert's Arm a right of search has been acquired over 33 square miles of ground, two square miles of which are now the absolute property of the company.

## DESCRIPTION OF PROPERTY.

Under the title of the Robert's Arm Mines 33 square miles of country are granted under right of search, and of these 2 square miles, embracing the workings already executed, are the absolute property of Captain Clery, who has leased them to the Newfoundland Minerals Company at a Royalty of 5*s.* (five shillings) per ton of ore extracted on a minimum production of 3,000 tons.

The charge for Royalty will not apply to future discoveries made on properties other than those leased from Captain Clery.

The Newfoundland Minerals Company will also possess rights of search over other properties in Conception Bay, on one of which three veins have already been discovered.

Mining works at Robert's Arm were only commenced

in May, 1879, and are naturally limited in extent. The accompanying section (Plan No. 1) shows the works actually in progress. A working 72 feet wide is being extended on the dip of the lode, which is 15 feet thick, of quartz mixed with yellow copper, assaying about 3 per cent. on the gross output—but which, by simple dressing operations, can be concentrated to 12 per cent.—and of a vein of copper worth 12 per cent. about 2 feet thick, the latter being worth from 7 to 8 tons to the running fathom.

In its present stage of development, the mine shows as favorable indications as Betts Cove and Tilt Cove did in their early stages, and already 250 tons of 12 per cent. ore and 1,000 tons of 3 per cent. have been raised. The former quantity is now on the pier awaiting shipment.

There is every reason to expect that when No. 4 shaft (section No. 1) intersects the lode, still richer deposits of ore will become available for extraction. Further explorations should be made east and west of the present workings, the indications being extremely favorable, and from these a largely increased output may be anticipated.

PLANT.—The plant already on the property, and which will be included in the sale of the mine, is:

1 manager's house.
1 store.
1 barn.
1 mill house.
6 superior houses.
29 workmen's houses.
1 whim and shaft house.
1 rock breaker (Blake's) and engine.
2 rotary crushers.
1 patent concentrating apparatus.
15 heads of stamps.
1 turbine, with shafting and gearing complete.
1 flume, 400 feet long.
1 30-ton lighter, or scow.

1 tramway, 2 feet 11 inches gauge and 8,800 feet long, raised above snow level.

5 wagons, of 2½ tons capacity each.

4 draught horses.

1 pier, with tramway, etc., complete, about 350 feet long.

Store goods, to the value of £800.

Mining materials, to the value of £550.

Hay, oats, etc. " " £200.

All in good order and condition, and the whole of which I estimate at the value of £8,000.

I estimate the value of the ore extracted at £3,000 upon the spot, namely, allowing for expenses of freight and charges at Swansea, making together £11,000 as the worth of plant and ore in sight. A further amount of £4,000 seems to have been spent in preliminary expenses and in mining works.

DRESSING FLOORS.—In order to utilize the abundant water power available, which I estimate at about 200 horse power, dressing operations will be performed on the south or opposite shore of Crescent Lake.

It is proposed to first pick over the stuff on floors situated near the principal shaft, where the best ore will be placed in wagons and trammed direct to the shipping wharf in the harbor.

The poorer portion of the output, consisting of stuff averaging from 3 to 6 per cent., will then be loaded into scows or barges holding about 30 tons and ferried across the lake at a cost of about 1*s.* 3*d.* per ton, where it will be dressed up to a tenure of about 12 per cent. This would enable a great economy to be effected in the case of low class ores, since it not only permits of a great saving in freight but also dispenses with the charges for crushing (3*s.* per ton) made by the English smelters.

The existing water power is derived from a river within a short distance of the crushing floors, to which it is conveyed by a flume about 400 feet in length, giving about 200 horse power.

The whole of the machinery it is proposed to use has not yet reached the mine; that which is actually erected consists of two rotary crushers—one capable of breaking 100 and the second 70 tons of raw material per day of twenty-four hours, and 15 Heads of improved American Revolving Stamps, each capable of treating about two tons of stuff working day of twenty-four hours.

MINING LABOR.—Labor can be obtained in any required quantity, and the physical standard of the workmen surpasses that of the average English miner. The wages now paid average from 3*s.* 6*d.* for ordinary laborers to 5*s.* 6*d.* per day for skilled miners. The rate of wages is on the decrease, as large numbers of men come every year from Nova Scotia and Cape Breton in search of employment.

MATERIALS.—These can be obtained at about the same rates as rule in English Mining Districts, and the same remark applies to coal.

COST OF LIVING.—A single man can live well for ~ and a family for about £3 10s. per month. The average earnings of the miners are about £6 per man per month.

STORES.—Convenient stores have been erected in the vicinity of the landing wharves for the supply of the mining population. The profits from these stores may be estimated at 25 per cent. or are, in other words, equivalent to the discount of that amount from the wages paid. Assuming a staff of 200 men to be employed, this would amount to a sum of about £2,400 per annum.

## HARBOR ACCOMODATION, FREIGHT, ETC.

A substantial pier, about 350 feet long, has been erected terminating in water 17 feet deep. This communicates, by means of a tramway 1 mile and two-thirds in length and 2 feet 11 inches gauge, with the mine. The harbor is perfectly land-locked and sheltered from every wind.

Freights to Swansea are 20s. 3d. per ton for steamers, 13s. 5d. for sailing vessels, and the rates of insurance are respectively, one-half and 1 per cent. Postal communication with St. Johns is maintained by means of a mail steamer which visits the principal mining centres in Notre Dame Bay twice a month, with the exception of the first 4 months in the year, when navigation along the east coast of Newfoundland is closed by the drift ice. During this period the mails are conveyed by messengers overland.

Telegraphic communication with St. Johns and Europe has been established by the Newfoundland government as far north as the principal mines, and will probably be extended to Robert's Arm (10 miles from the main wire) as soon as the workings assume sufficient importance.

COST OF PRODUCTION.—A large proportion of the ore raised will assay over 12 per cent. for copper, and will not cost, including mining, breaking, picking, hauling, loading, and all charges in Newfoundland, more than £1 10s. per ton. A further portion, which must be dressed or concentrated to render it marketable, will cost £2 10s. per ton. The exact proportion of each it is difficult now to determine, but, from calculations made on the spot, I arrive at 36s. as the mean price for 12 per cent. ore of the two classes together, and, although with extended operations the cost per ton is likely to decrease rather than increase, I consider it prudent to adopt £2 per ton in my subsequent estimate as the cost of the ore placed on board in Newfoundland.

ESTIMATE PER TON.

| | | £ | s. | d. |
|---|---|---|---|---|
| Cost on board in Newfoundland | | 2 | 0 | 0 |
| Royalty | 5 0 | | | |
| Freight, say | 15 0 | | | |
| Swansea charges | 5 3 | | | |
| Conversion into tons of 21 cwt. | 7 0 | | | |
| Insurance | 1 6 | | | |
| Commissions, 1¼ per cent. | 2 0 | 1 | 15 | 9 |
| | | £3 | 15 | 9 |

The present value of 12 per cent. ore is 13s. per unit, or £7 16s. per ton, and there is a profit therefore of say, £4 per ton.

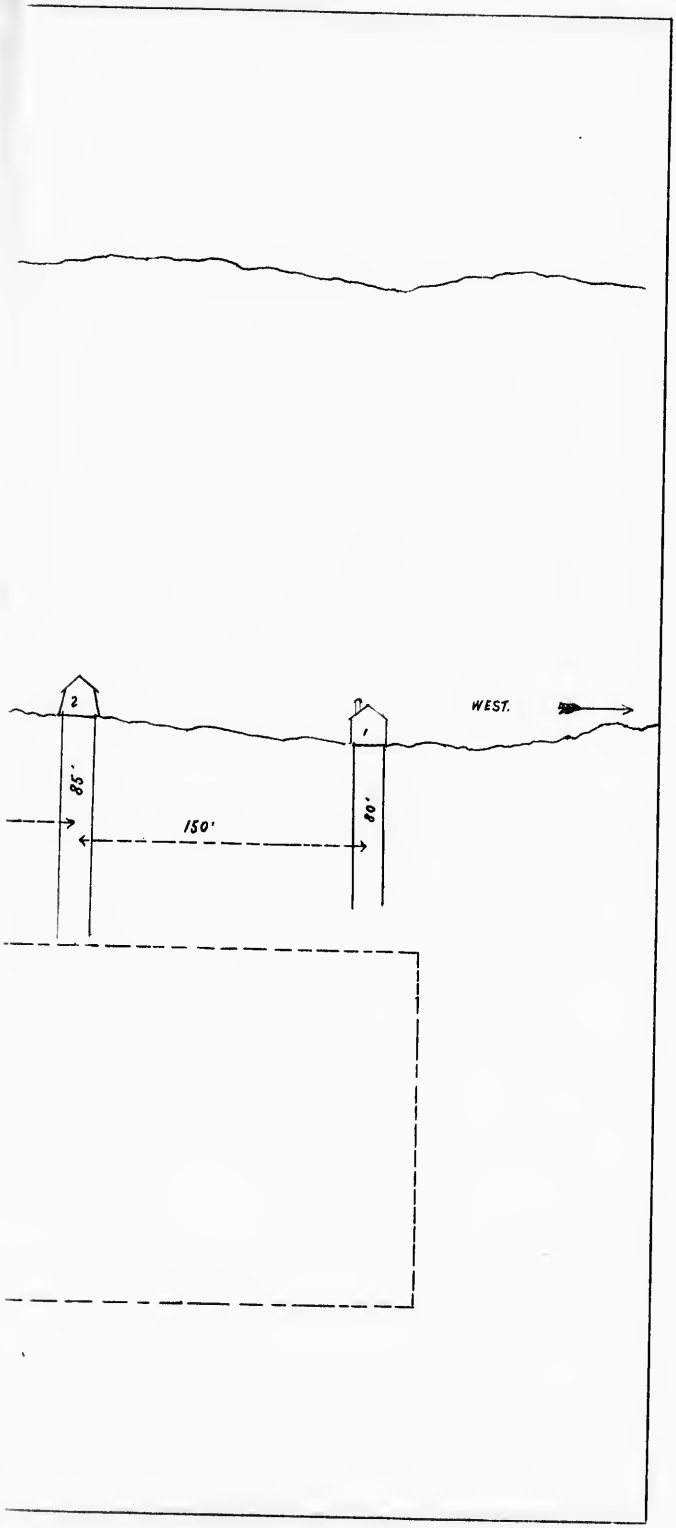
RATE OF PRODUCTION.—With only one working, as described, and less than 30 men, of whom 18 only are miners, the daily production of copper is nearly 4 tons of 12 per cent. ore and 6 of poor ore, which can be converted by concentration into 1½ tons of 12 per cent. tenure. Say 5½ tons of marketable ore, leaving, as above estimated, nearly £20 per day profit, from which, however, some reduction must be made for expenses of management in Newfoundland and England,—expenses which will weigh comparatively heavily on a low rate of production, but will proportionately decrease as the output of the mine becomes greater, as it rapidly will do.

By the end of June, it may be expected that 1,000 tons of marketable ore will be ready for delivery, and a similar quantity in the latter end of the current year,—quantities sufficient to leave a large profit on the first year's operations. Satisfied as I am that the local management (if the arrangements proposed are carried into effect) will be conducted with skill, energy, and economy, *I consider 4,000 tons per annum a moderate estimate of the future returns*, and that a profit of from £2 10s. to £3 10s. per ton will be made.

The appearance of the vein already opened out, and the mineralized character and extent of the neighboring district which will be included in the property of the Company, justify an opinion that *this rate of production will be continued for 20 to 30 years.*

Such a production of 80,000 to 120,000 tons from the property is not high when it is remembered that adjacent mines have produced over 100,000 tons within the last 5 years, and a neighboring mine, commenced in 1878, 20,000 tons in one year, without any signs of decrease in their probable output.

Newfoundland is destined to become one of the most, if not the most important centre of copper production.


2
1
WEST.
85'
150'
80'

There seems to be a good future for the copper trade, and at present prices the working of Robert's Arm will leave large profits; and would leave some profit even at the lowest prices which copper has recently touched.

I have taken throughout 12 per cent. as the standard of ores which will be delivered in England. Some ores will undoubtedly be delivered of a lower tenure, but these I have excluded from my calculation and estimates; they will however, naturally leave some margin for profit, otherwise they would either not be shipped or would be picked and dressed to a higher percentage.

My assistant, Mr. Seymour, who made the inspection, has a quantity of detailed notes and can give many particulars which I have not thought necessary to insert in this report.

I shall be glad to wait upon you and to give any further information you may require.

I remain, Gentlemen, your obedient servant,

(Signed) T. SOPWITH,
Memb. Inst. C. E.

## APPENDIX.

Analyses made by Messrs. Richardson & Co., of Swansea.

(Copy) Assay Office and Laboratory Ore Wharves,
Swansea, January 5th, 1880.

Samples of copper ore received January 3d:

No. 1. Sample of prill ore ready for shipment. Copper, 19⅜ %. Silver—Traces.

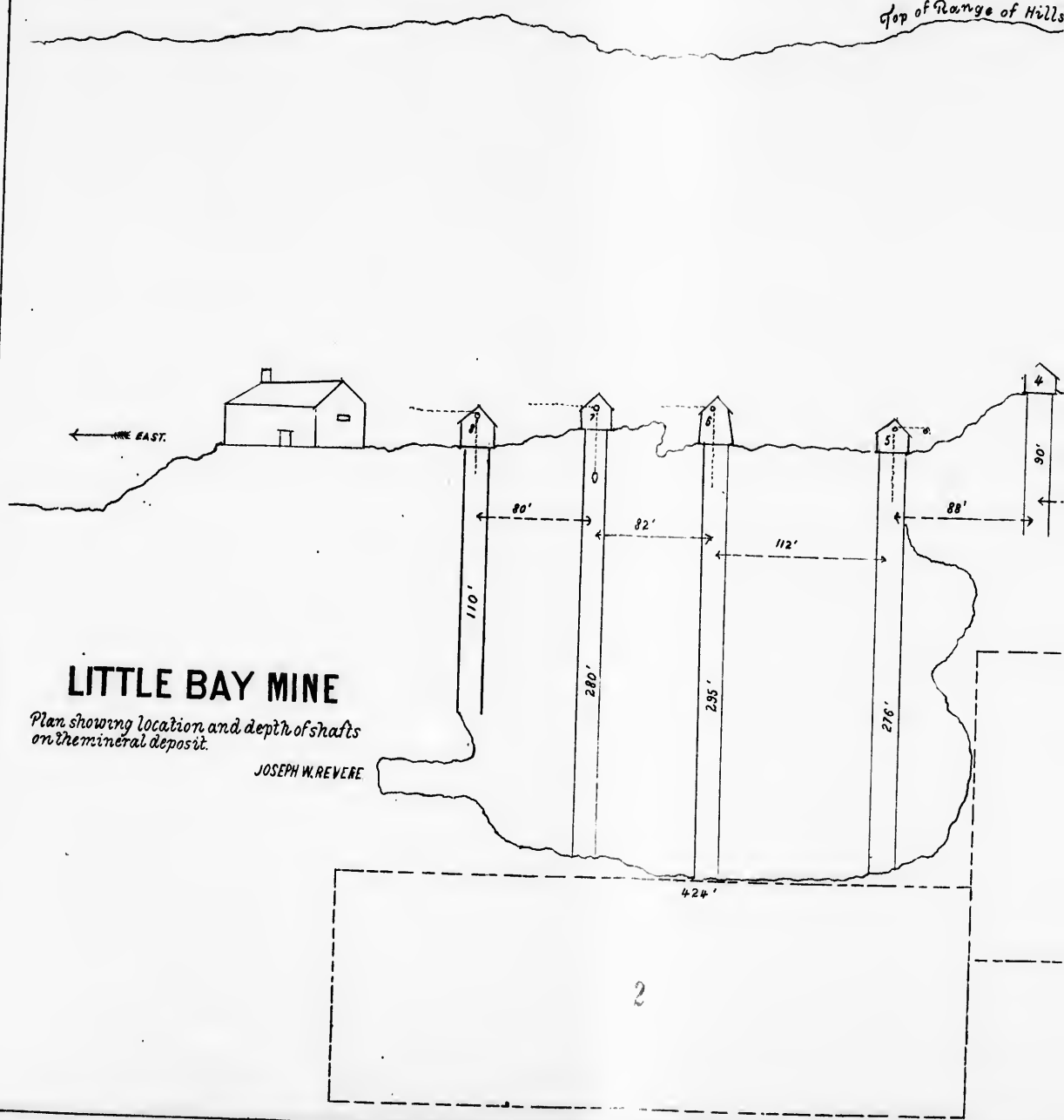
No. 2. Sample from quartzose portion of vein Copper, 5⅜ %. Silver—Traces.

No. 3. Sample from chloritic portion of vein in foot wall. Copper, 6¾ %. Silver—Traces.

No. 4. Sample from vein in principal stope. Copper, 4⅝ %. Silver—Traces.

No. 5. Sample of partly concentrated ore from crushing mill. Copper, 4½ %. Silver—Traces.

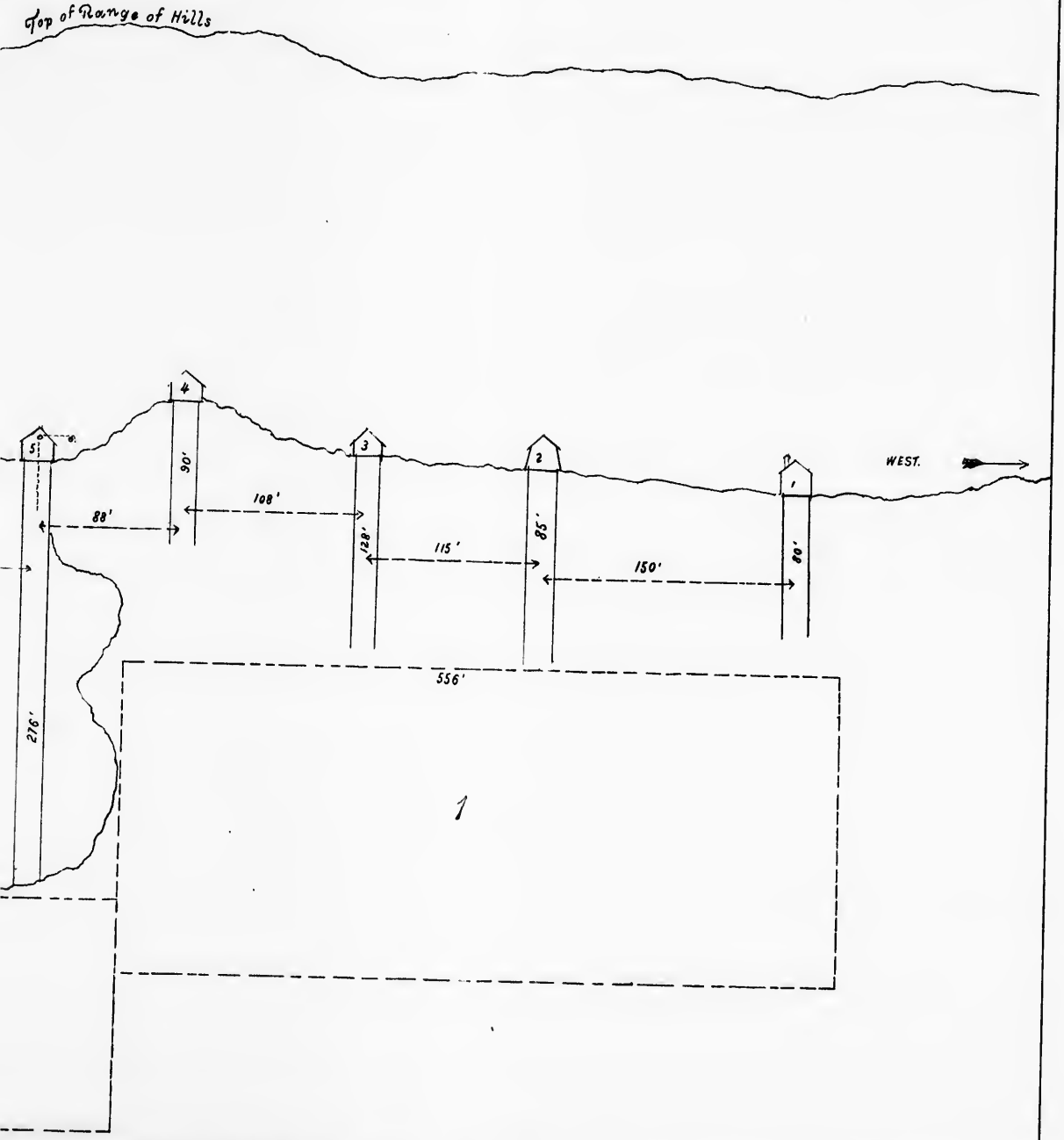
(Signed) J. HERMANN JAMES.




# LITTLE BAY MINE

Plan showing location and depth of shafts on the mineral deposit.

JOSEPH W. REVERE


Top of Range of Hills
5
4
3
2
1
WEST.
88'
90'
108'
128'
115'
85'
150'
80'
276'
556'
1

# REPORT ON BETTS COVE COPPER MINES, NEWFOUNDLAND.

By David Rankine, C. & M. E.

The following report was made, at the request of the late William Dixon, by Mr. David Rankine, of Messrs. Ronald, Johnstone & Rankine, of Glasgow, who are among the leading mining-engineers in the United Kingdom. M.

Glasgow, 27th August, 1878.

Having been asked to give a summarized view of what came under my observation during my recent visit to the mines of Betts Cove, as more fully detailed in my report of the 3d inst., I note the following as the more salient points:

The copper-bearing rocks at Betts Cove are a chloritic slate, more or less impregnated with copper. In some cases, the ore is concentrated in pockets; in others, it is intermixed throughout the rocks, while in others it is found in veins. Where the veins appear on the surface, they are of narrow width, and show but faint traces of copper. They dip at an angle of about 80°, and when sunk into, are soon found several feet in width, expanding at no great depth to as many yards of ore, one-half of the mass of which may be readily hand-dressed to a 15 per cent. ore, the other containing about 4 per cent. copper.

The mining operations have been practically confined to Betts Head, which abuts on Betts Cove, and to three veins of ore which have been found lying almost parallel to each other. The mode of working has been by sinking shafts in the veins, cross cutting from one to the other, driving lateral mines at different levels in the veins and "stoping" the ore between. The veins frequently swell into large pockets, the whole, or as much as can be safely got being mined out, and an immense chamber thus formed below ground. The workings have not extended much beyond a length of about 150 yards, a breadth of about 50 yards, and depth of about 70 yards. That depth has been won by sinking shafts, and

from these, galleries have been broken off at three different levels, the first about 25 yards from the surface, the second about 50 yards, and the third about 70 yards. The second level is now reached by a vertical shaft, known as the "Engine Shaft," by which the ore is almost wholly raised to the surface.

The third level is won and worked by an underground incline which falls away from near the bottom of the "Engine Shaft." There is still a fourth or lower level, 20 yards under the third, which has been won by winzes sunk from the third level. Little mining has yet been done from or by it, one reason for that being the want of time, the other reason being that between the third and fourth levels the rocks gradually become more homogeneous and ready with an almost vertical cleveage, the copper being disseminated throughout the rocks, and the whole so friable that the drift mines must be carefully timbered and geared.

The quantity of ore actually shipped during the last three years from the limited area referred to was 60,000 tons, and within that area a large quantity of ore is now disclosed standing in the pillars, floors, and roofs of the various levels.

A further quantity is proved by mines, but which by reason of the percolation of water from the ponds above cannot be worked. It is almost impracticable to put a figure on the quantity thus disclosed, *but it should amount, I believe, to several hundred thousand tons.*

As before stated, the surface indications of the ore are comparatively minute. Nevertheless, such as they are, they seem to me clearly to indicate a continuance of the veins now being worked onward to the sea at Chance Cove, a distance of 1,100 yards.

At various points in that distance the veins show on the surface, having similar outward characteristics, both as regards "strike" and inclination.

At the time of my visit the sinking of twe shafts had been commenced in one of the veins near Chance Cove.

One of these shafts had been carried down about five fathoms, the vein being found of increasing thickness and

richness. The veins were also being further proven by mines driven from the shafts at Betts Head in a north-west direction, and these showed that the ore held onward in that direction equal in quality and quantity to that which had been worked.

It therefore seems to me that all the indications lead to the conclusion that the Betts Head operations have as yet merely tapped the deposit which may be reasonably expected to be found there.

If I am correct in the opinion thus formed there should practically be no limit to the profitable endurance of these mines, for although considerable mining skill has been displayed in past operations, I am satisfied that much can yet be done in reducing the cost of raising the ore, in recovering what is now standing in the floors, roofs, and pillars, in working the deeper and softer ores, and in reducing the cost of transit from the mines to the place of shipment.

Savings in these respects would allow for further reductions in the value of copper without diminishing profits, and in the event of copper attaining former or even maintaining present rates the outcome from the mines would leave a large percentage of profit. Such a result would, I believe, flow from the adoption of the scheme I advocate, viz.: The driving of a mine from near the level of the sea at Chance Cove, the mine being driven along the strike of ore of the copper veins and in itself being a paying work.

The important points to be achieved by such a mine are the draining of the whole deposits to a depth of one hundred feet under the present deepest working, and the working out of the whole mass of ore by open quarrying, at a cost per ton probably less by a half than what is now incurred, while great additional facility for airing the mines, where mining must be resorted to, would be also obtained; and by the construction of a tramroad along the margin of the sea from Chance Cove, the cost of transit to Betts Cove would be largely reduced.

A better mode of transit would, however, be had by driving another level mine direct from Betts Cove to Betts

Head, although the construction of that might be reasonably deferred until the rocks between had been proved by boring.

Such a work would repay itself in three or four years, and after that would result in a gain of several ~~hundred~~ thousand pounds per annum.

These remarks have been principally directed towards the development of present mining operations.

But beyond that there are indications of other veins of profitable character extending from Dr. Earl's Point, and also from Burton's Pond; the former have been only partially tested by shallow sinkings and surface explorations, which, although not yet disclosing such rich masses of ore as have been opened out at Betts Head, nevertheless give good grounds for believing that the deposits only require further opening out to prove of high value.

With regard to Burton's Pond: It was at one time worked by a company who, after some mining and sinking in two veins which outcrop near the sea, abandoned the work with, I believe, the loss of a large amount of money.

They, nevertheless, took out a considerable quantity of good ore, while I was there; the water which had accumulated in the shafts is being pumped, and it was removed to such extent that partial access was obtained, and good samples of ore were got.

I am hopeful that, with facilities now to be had through Betts Head establishment, this will prove a valuable auxiliary.

With reference to the plant at Betts Head, perhaps all that is necessary to remark in regard to it is that it is most complete and ample. The harbor at Betts Cove affords good anchorage, and the quays which have been constructed can accommodate a considerable amount of shipping. During the fortnight I was there the loading of a steamer with 1,400 tons of ore was completed. The steamer I went out with was discharged of 500 tons of coke, and loaded with 1,900 tons of ore; a sailing vessel, with about 1,400 tons of cargo, being also in process of discharging, there being also

ample wharfage for the coasting steamers and other shipping that now frequent the place.

The roads, railways, houses, stores, workshops, foundry, and other works and plant, are all on a similarly complete scale, while the jigging machine and the smelting works erected, and erecting, will, for the future, permit the poorer ores to be profitably utilized. There is, indeed, an abundance of plant and machinery on the ground, and labor can be also readily commanded. At my first visit four years ago, the place was nothing but a rocky wilderness, utterly devoid of all accommodation or appliances whatever, and comparatively scanty evidence to be obtained of the store of wealth within.

I nevertheless ventured to express a high opinion of the leaseholds, and that has been fully borne out by the results. Much of that success has been due to the energetic and able management of Mr. Ellershausen, and under his direction I look on the future with equally sanguine expectation.

Reported by

(Signed) DAVID RANKINE.