

law of nature that the energy of motion is as the square of its velocity, it is evident that wheels discharging water at nearly or fully one-half of its entering velocity must waste a large percentage of the power of the water in that way; and this is a prolific source of loss in many of the popular varieties of turbines now in the market, which are readily sold to inconsiderate buyers at somewhat less price perhaps than those of more honest proportions, though their cost to the user, who needs the power they waste, is often many times that of properly proportioned wheels.

#### THE ASBESTOS FIELDS OF PORT AU PORT, NEWFOUNDLAND.

BY C. E. WILLIS.

The metamorphic rocks, and serpentines, of the Eastern Townships of Quebec, and the Gaspé Peninsula, in which the Canadian asbestos, or more correctly speaking, chrysotile, is found, dip under the Gulf of St. Lawrence, appear again on the west coast of Newfoundland, and extend many miles inland, probably entirely across the island, though in places, specially on the great elevated central plateau, they are capped with granitic rocks, and seemingly have disappeared.

Here and there, also, are great mountains of magnesian limestone, and in the region of the Grand Lake, and other isolated sections, are found carboniferous basins, with small seams of very good bituminous coal. Still this entire area, extending about 100 miles north and south, and the entire width of the island east and west, can be safely called a serpentine country, and contains, according to Mr. James P. Howley's estimate, 5,097 square miles of serpentine rocks.

The region is exceedingly rugged and picturesque. Cut by deep gorges and ravines, with towering and precipitous mountains, and craters of extinct volcanoes, with streams and lakes of the most crystal clearness, and everywhere cascades, of from a few feet to many hundreds of feet in height, combine to make a district of surpassing grandeur and interest, not alone to the mining engineer, but to anyone who loves nature in its wildest moods.

The serpentines, with the granulite dykes which everywhere intersect them, contain vast deposits of minerals, and are to-day nearly virgin fields, except on the immediate coast line, for the prospector and miner, and certain to become in the immediate future the seat of great mining operations.

That the country has not long ere this taken a first rank as a mineral producer, is due to its former isolated position, its difficulty of access, except in small sailing vessels, and other ulterior causes; but now, with regular and frequent steam communications, the prospector and engineer are forcing their way into the country, and soon it will be the scene of prosperous mining camps, and a large mining industry. The minerals met with are copper, which is found everywhere, magnetic, hematite, chromic and specular iron ores, coal and petroleum, gold, silver and lead, nickel, iron pyrites, antimony, marbles, gypsum, mica and asbestos; and it is to the latter that I shall devote a few remarks.

The existence of asbestos in this great belt of serpentine has long been known, or supposed, and several well known geologists, in their writings as far back as ten and fifteen years ago, have predicted that it would be discovered in quantities sufficiently large to

be of economic value, but it has only been within the past three years that the attention of the miner has been turned in this direction, and it is now attracting much interest in the Island. On the eastern coast of Port au Port Bay, rising out of the sea to a nearly vertical height of 1,800 feet, is a mountain known as Bluff Head. This mountain determines the southern boundary of the serpentines. For many miles north the coast line is precipitous and lofty, culminating at Cape Gregory in a bluff nearly 2,500 feet high. At Bluff Head, and extending for about one mile north, the beach is composed of conglomerate, very hard, and highly polished on the surface by the action of the surf which breaks upon it. The beach is strewn with boulders of all sizes which have fallen down from the cliffs, and nearly all of them contain seams of asbestos, while the conglomerate of the beach itself is filled with it. It was here the asbestos first really attracted much notice. Long known to the fishermen of the neighborhood as "cotton rock," it came to the knowledge of the Hon. Daniel Cleary, of St. Johns, who some three years ago equipped a small expedition to do some prospecting in the neighborhood.

The success met with was so immediate and marked, that other claims were immediately secured, till in a short time some 30 square miles were taken up by prospectors and speculators, and the past summer has witnessed a large amount of development work. Much of this work has been of the most satisfactory nature to the owners, and proves the field to be a large and valuable one, but from my observations a very large part of the district now held under leases and licenses will be valueless as far as asbestos is concerned, but this always is the case in a new mining country where speculators rush in, and secure claims, without having previously been on the ground. About one year ago I visited the district and secured claims on what promised to be valuable asbestos ground, and with this as a basis to start on, the Halifax Asbestos Co. (Ltd.) was organized. The property consists of two areas of 640 acres each, each containing one square mile, and situated on both sides of a deep gulch, or ravine, the dividing line being lengthwise through this gulch. The ravine mentioned runs in nearly a true north and south course, from the shore inland for about five miles, where it is cut at right angles by the valley of the Fox Island River, and terminates at the inner end in this valley. The sides of the gulch are very precipitous, having more slope where we have been working this summer than elsewhere, and rise to an elevation of 1,700 feet on one side, while on the other they in places reach to a height of over 2,000 feet. The walls are nowhere, I think, in the entire length of the valley, less than 600 or 700 feet high. It might be said of the property, that it is an ideal one for mining, as no hoisting engines, or pumping, will ever be required in the future operations of the company. The claims are about three and one-half miles from the sea by the gulch, though but little more than two miles in a straight line from the shore; we will, however, reach the shore in the future through the valley of the Fox Island River, which, though it makes a somewhat longer route, brings us to the shore at a fine shipping point, and admits of the building of a road with very easy grades, in fact none whatever to speak of.

The Government of Newfoundland being keenly alive to the necessity of fostering its mining industries, has undertaken to construct a good road by the route