To show the similarity which exists between Grand lake and Cape Breton coals, I append the following average of the analyses of Cape Breton coals as given by the Geological Survey of Canada, and confirmed by a complete set of analyses made by Dr. Gilpin:—

Volatile	33.44
Fixed carbon	61.87
Ash	4.22
Sulphur	2.37

Grand Lake coal ignites quickly and burns with a bright flame. Screened Newcastle coal is an excellent house and steam coal, whereas the fine is well known as a blacksmith coal of superior quality.

The great difficulty heretofore in the way of obtaining the deserved place in the market for Newcastle coal, arises from the fact that farmers holding land in fee simple are allowed the privilege to mine the "surface seam" on their property, without the payment of royalty to the Government. Each farmer having conditions favorable, therefore, mines coal on his own land. He usually lets the mining out by contract, paying the contractor so much per chaldron. The miner, if not very scrupulous, allows a certain percentage of shale, pyrites and poor coal to make up his chaldron, and the coal not being picked or screened generally goes to the market in a very bad state.

Dr. Gilpin, in writing of this coal, states, "when properly cleaned and handled it should furnish a good quality of coal, comparing well with other maritime coals."

In regard to quantity of coal available in the Newcastle field (that is the district between the Newcastle and Little rivers), we have 40 square miles of coal area. Assuming specific gravity of coal to be 1·26, or weight 78·75 lbs. per cubic foot, and taking 20 inches as average thickness of seam, we find that in an acre we have 2,552 tons; and for 40 square miles we have 65,331,200 tons. Allowing 20% for areas where the seam is eroded by streams, this gives us a balance of over 52 million tons available in this district. The Geological Survey report estimates the coal of the Grand lake coal field at not less than 154,948,000 tons.

Mining operations have been continued on a small scale for over thirty years, with an annual output of about 4,000 chaldrons. Not more than 125,000 tons have been mined in the district.

With the present limited output the coal costs the miner about 80 cents per ton, including timber, stores, etc.

The cost of teaming the coal to the lake shore (three to six miles) is from 45 to 70 cents per ton. Cost of shipment to St. John or Fredericton by wood-boats, 70 cents per ton. Total cost in St. John or Fredericton, $2.20 per ton.

Screened Newcastle coal, with proper facilities for mining, handling and transport, ought to be landed in the above named places for little more than half the present cost.

Nova Scotia Coals as Steam Producers.

By F. H. Mason, F.C.S., and W. G. Matheson.

The object of this paper is to place on record some results obtained from an analysis of samples of coal from the various mines in Nova Scotia This was undertaken principally because of the fact that it is impossible in any books of reference known to the writers to get at any information as to the thermal value of the fuel we are compelled to use, and hence the difficulty of instituting a comparison between the duty of any steam plant using our own coal and those using coal mined elsewhere. It is not unusual to find full information concerning coals of other countries, and hence well known, while our own coal is all disposed of in one item, and that comparing by no means favorably. Of course this is entirely as regards coal as a fuel as being capable of evolving so much heat, of being able to evaporate so much water, of containing so many T. U. With its properties as a gas producer, or its value for coking we have nothing to do. Most of it is used for generating steam, and its value for this is what concerns us most. How many lbs. of water will one lb. of it evaporate? That is the question we wish to settle, for on this depends the comparison of one steam plant with another. We find that at such a place, for instance, one steam user is evaporating 6 or 7, or 8 lbs. of water per lb. of coal, while others are doing 9 or 10, or 11. Why the difference? Is it due to difference in design of generators, or difference in quality of fuel? Or if one manufacturer decides on testing his plant what about the result? for he knows nothing of what the fuel he is using is capable of doing, and hence the result is more or less valueless. If it is high he is probably satisfied, but if it is low or only fairly good, where does the fault lie? Is he using a generator that is wasteful or could he get better fuel for his money?

The only method of his satisfying himself on this point is by knowing the calorific value of the fuel, and to get at this value of the different coals in the province was the reason for instituting the tests herewith recorded.

Nova Scotia Coal.

The method used for taking the calorific power of the various coals was a calorimetric one, and the instrument used was a modification of the Thompson calorimeter. In order to make the results the more comparable, the initial temperature of the water in each case was the same. The combustion of the coal was brought about by a mixture of 2 parts of chlorate of potash and 1 part of nitre. The formula by which the results were calculated was the usual one, namely:

$$x = \frac{(t'-t'')(w+cs)}{n}$$

n = weight of coal.
w = weight of water.
c = weight of copper in calorimeter.
s = specific heat of copper.
t'' = initial temperature of water.
t' = final temperature of water.

There also has to be a correction for the heat taken up by the glass. We consider that for a laboratory test which will give the truest calorific power of a coal the calorimetric test is in advance of any other method.

Attempts have recently been made to revive Berthier's method for estimating the calorific power of coal. This method consisted of placing a weighed quantity of finely divided coal thoroughly mixed with more than sufficient mon-oxide of lead to completely oxidize it, and calculating the calorific power from the resulting button of lead. A little thought will show that this method is not reliable, although at times it may closely approximate the true calorific power. It is an open question whether some of the more volatile matter of the coal will not become volatilized at a temperature below that required to reduce oxide of lead, but setting aside this by no means unimportant factor, there are other reasons which will render Berthier's method valueless.

There are three constituents of coal whose action on oxide of lead it is mainly necessary for us to study, namely, carbon, hydrogen and sulphur.

The final chemical action of these three substances on litharge may be expressed by the following equations:—

$$2\,PbO + C = 2\,Pb + CO_2$$
$$PbO + 2H = Pb + H_2O$$
$$2\,PbO + S = 2\,Pb + SO_2$$

Taking the atomic weight of lead as 207, oxygen as 16, hydrogen as 1, carbon as 12, and sulphur as 32, we get following equivalents of lead for each of the elementary component parts of coal under consideration:—

1 part of carbon	= 34.5	parts of lead.
1 " hydrogen	= 103.5	" "
1 " sulphur	= 12.9	" "

We next have to consider the calorific power of each of these elements, for which purpose we propose to take the figures obtained by Sibbermann:

Carbon	= 8080 calories.
Hydrogen	= 34462 "
Sulphur	= 2216 "