

## Notes on the Grand Lake Coal Field of New Brunswick.

By R. G. E. LECHE, B. Sc., Torbrook, N.S.

The Grand Lake coal-field is situated about seventy miles north of St. John city, and in a direct line between Fredericton and Moncton, twenty miles east of the former town, and fifty miles west of the latter. It is thus the nearest coal field to the Province of Quebec, being four hundred and eighty-four miles from Montreal by rail, (25 miles of which, between Grand Lake and Fredericton, have not yet been constructed) or more than 200 miles nearer than the nearest Nova Scotian coal field. The distance by rail to St. John, *via* Fredericton by C.P.R., is 90 miles, and the distance by water 80. To Fredericton, the distance by river is the same as to St. John: the river and lake being navigable for boats drawing under nine feet of water.

The coal field lies to the north of Grand lake, extending inland from the shore about 10 miles.

Grand lake, 25 miles long, and from 4 to 7 miles wide, is a navigable arm of the river St. John, and into which flow several large streams.

The coal-field extends from Coal creek on the east, to Little river on the west, while through it run the Newcastle and Salmon rivers. The southern boundary is the lake shore, while the northern limit has not yet been absolutely determined, owing to the existence of extensive bogs, out of which the rivers mentioned take their rise.

The area thus bounded contains about 100 square miles, and comprises the operative, or workable field, the most productive section of which, is that portion west of the Newcastle river, and known as the Newcastle field. Workable coal has recently been discovered west of Little river, which I think may prove of importance, owing to its proximity to Fredericton in comparison to the rest of the field, but its extent has not yet been determined. The strata in this district lie almost flat, rising gently from the lake shore inland in a north-westerly direction. The dip seldom exceeds four or five degrees. The undulations are gentle and in no case abrupt, the surface generally conforming to the folds of the strata.

Prof. L. W. Bailey and Mr. G. F. Mathew, in their report for the Geological Survey of Canada, (Report of Progress 1872-73) divide the carboniferous formation of Central New Brunswick somewhat as follows:—

*Lower Carboniferous*, composed of red conglomerates and sandstones, red shales and purplish doleritic rocks containing zeolites.

*Middle Carboniferous*, sub-divided as follows:—

**BARREN MEASURES:** Resembling the millstone grit of Nova Scotia—consisting of grey conglomerates, coarse grey grits and sandstones, and grey sandy shales. Thickness, 200 feet.

**PRODUCTIVE MEASURES:** Corresponding to the lower productive measures of Nova Scotia—consisting of finer grey sandstones, fossiliferous shales, fire-clays and coal seams. Thickness, 200 ft.

*Upper Carboniferous*, consisting of purple sandstones and shales. Thickness, 200 ft.

The only coal seam in the Grand lake coal-field known to be of economic value is the "surface seam." This seam consists of very clean coal, of an average thickness of 2 ft., but varying in places from 1½ to 3 ft. It is generally accompanied by a smaller seam, from 6 to 8 inches in thickness, which occurs either above or below it, in different localities, and is separated from the larger seam by a few inches of fire-clay. The "surface seam" has been found to underlie continuously the whole coal field, save where it has been eroded in the localities where the streams cut through the bed.

The term "Newcastle coal" has been applied to the coal mined in the vicinity of the Newcastle river, and in the district between the Newcastle and Little rivers. In this district the seam is thicker, and of much better quality than in the eastern portion of the coal field, where coal mining operations were first pursued.

The Grand lake coal was first discovered by the French about 200 years ago, near the mouth of the Salmon river, where the seam is about 20 in thick, and of rather poor quality. With the belief that thicker beds of coal existed below the surface seam, boring operations were commenced in 1837 by a private company organized for the purpose. The first bore-hole was put down near the mouth of Salmon river, and a depth of 403 feet was reached. At 21 ft. the "surface seam" was encountered, 1 ft. 10 in. thick, and at a depth of 262 ft. a bed of bituminous shale and coal was struck, 8 ft. in thickness. The method of boring, however, was unsatisfactory, and on this account a second boring was made in 1866 on Coal creek, five miles west from the first, but was only carried to a depth of 96 ft., when the drill became jammed in the hole, and operations suspended. The surface seam was the only coal passed through.

Again in 1870, another boring on the Salmon river proved equally barren of satisfactory results. A seam of impure coal, 6 in. thick, was found at a depth of 96 ft. Disagreement between members of the company caused cessation of work, when a depth of 218 ft. had been attained.

In 1872-73 boring operations were conducted by the Local and Dominion Governments, near the Newcastle river, at a point 3 miles inland from the lake and 12 miles west of the old bore-holes. Mr. K. W. Ellis superintended the work. Two holes were put down, 170 and 190 ft. respectively: but apart from the "surface seam" no coal was struck.

The same year (1873), at a point 3 miles south from the last holes, and half a mile from the lake shore, a bore-hole was sunk to a depth of 400 ft., the last 100 ft. of which appeared to be in a formation underlying the coal measures. No coal was reported from this boring.

Taking the result of these bore-holes, and considering the careful explorations conducted in this district by Prof. Bailey and Mr. Mathew, we may safely state, although possible, it is by no means probable, that there exist other seams of value underlying the "surface seam."

I have stated that the area of the Grand lake coal-field is about 100 square miles: but this does not include that portion of the district where the upper carboniferous overlies the productive measures.

A remarkable fact in connection with this coal seam is that in no place has the coal been found at a greater depth than 45 ft., and it is not probable that at any spot, in the Grand lake coal-field proper, it lies at a greater depth than 60 ft. below the surface. This fact, therefore, enables the coal to be mined at any point by sinking of shafts comparatively inexpensive and requiring no heavy machinery, but rather that of a portable nature, which could be moved from place to place as the coal became worked out.

Hundreds of acres have been proved by means of test pits, where the coal is merely covered with a few feet of alluvial, and would be won by the process of stripping. Steam shovels could be advantageously employed in this connection. The areas capable of being thus stripped occur mostly at or near the heads of the various brooks.

An important and valuable feature of this coal-field is that, from the position of the coal seam, it has a natural drainage by means of the streams which traverse it, cutting through the strata at a lower depth than the coal.

The coal obtained from the "surface seam" is bituminous and of the coking variety. The following are some of the analyses of Newcastle coal, made by Wm. Smail, B. A. Sc.:—

	I. Newcastle River.	II. New Zion.	III. No. 18 Brook.
Volatile.....	37.30	35.25	37.10
Fixed carbon.....	59.35	55.80	61.10
Ash.....	3.35	4.20	1.80
Sulphur.....	2.66	1.68	1.95
Coke.....	62.72	60.00	62.90
Moisture.....	....	4.75	....