Waikawa Harbour.—Several thin seams as marked on the plan. The coal is good, but the seams are thin and irregular as far as yet explored.

If you should think it necessary to assist your investigation by "boring" in any part of the above district, you will inform me on the subject at as early a date as possible.

I have, &c.,

Captain Hutton, F.G.S., Assistant Geologist. JAMES HECTOR.

Enclosure 2 in No. 11.

REPORT on the COAL FIELDS of the Southern District of OTAGO by Captain HUTTON, F.G.S.

I HAVE the honor to report that I was engaged from the 4th January until the 21st February last in examining the coal deposits of the Southland District, between the Mataura and Waiau Rivers, and the following is the result of my examination. The geology of the district will form the subject of a separate memoir.

The coal fields of this district may be divided into four areas, viz. :—

1. The Hokanui District.
2. The Mount Hamilton District.
3. The Wairaki District.
4. The Oropuki District.

The two first contain seams of black bituminous coal, the two latter brown cannel, or pitch coal. Extensive deposits of lignite, sometimes of very good quality, are also found in the valley of the Mataura, at Oropuki, and near Invercargill; but as these can never have more than a local value, I shall make no further mention of them in this report.

1. *The Hokanui District.*—This district includes the whole of the Hokanui Hills, with the exception of the northern corner. The rocks are green sandstone, shales, grits, and conglomerates, which dip at angles never exceeding 20° in various directions. The same formation extends under the plain between the Hokanui and the sea, but it is here covered by a thick deposit of alluvial gravels containing beds of lignite.

At present coal has only been found iu a few localities on the seaward slope of the Hokanui, and even here only in seams too thin to be worked with advantage.

Up a small creek flowing into the Otapiri, three thin seams of coal have been discovered, none of them however exceeding six inches in thickness. Higher up, I am informed by Mr. J. R. Thompson, a seam of carbonaceous shale about four feet thick exists, but without any good coal in it. This, probably, is the carbonaceous shale referred to in the Colonial Museum and Laboratory Report, 1868, p. 18.

West of the Makarewa, coal has been found in several localities near Mr. Anderson's farm, but were also it does not exceed a foot in thickness. This coal is black, and does not fall to pieces on exposure to the weather. It has not yet been analyzed, but will no doubt prove of superior quality, and if it can be obtained in a seam of not less than three feet in thickness, would be of considerable value.

It is, I find, a commonly received opinion, that those portions of the formation that occupy the flat land below the gravels forming the plains between the Hokanui and the sea would not be so much disturbed as those portions that form the hills, and therefore, that if coal could be found in the flats, by boring through the gravels, it would be much more advantageously placed for working; the supposition being that the hills are owing to an uplifting of the strata in those localities, while in the plains they have remained undisturbed. This, however, is quite a mistake, as the whole of the formation has undergone the same amount of disturbance, and the hills are of that class sometimes called "hills of denudation;" that is to say, that they are higher than the plains simply because, where the plains now exist, the rocks have all been washed away down to that level. If, therefore, a seam of coal was found below the plains, there is no reason to suppose that it would be less disturbed than if it was in the hills; and a mine situated in the plains would entail great expense in pumping and lifting machinery, while one situated in the hills could probably be worked level free. The plains also could only be explored by boring, which would be a very expensive operation, especially as the bore would have first to penetrate through a considerable thickness of loose gravel in which the rods would be liable to stick fast, and would then have to be continued down through hard sandstone. The hills, on the contrary, can be easily explored in the gullies, and a much greater extent of the formation, both horizontally and vertically, can be examined than by boring. As, therefore, there is as yet no evidence for the supposition that a coal seam thick enough to work underlies the plains, it would in my opinion be only throwing money away to attempt exploration by boring; and instead, in order to encourage the the prospecting of the hills, I should recommend that a reward be offered for the discovery in the Hokanui Hills, of a coal seam sufficiently thick to pay for working. This might, perhaps, be defined as a seam having a total thickness of not less than four feet of good coal within a vertical depth of not more than six feet.

The same formation as that in which the coal is found in the Hokanui extends also across the Mataura River nearly as far as the Clutha, and from the sea nearly as far as the Kahiku Mountains. Thin seams of coal have also been found in several places in this district, as Waikawa, Toi-tois, Islay, Wyndham, &c. At Toi-tois, near the mouth of the Mataura, Mr. Brunton has explored some outcrops of coal by drives, and a shaft. The following is the section at this locality :—

Conglomerate, green sandstone	200 +
Fireclay	6·0 about.
Coal, with shale partings	1·6
Dark gray shale	40·0 about.
Coal (seven thin seams with shale)	6·0
Green sandstone	20·0 about.
Conglomerate	15 +

The whole dip, 6° N.N.E.