

## 6. LIVERPOOL STATE COAL-MINE, ETC.

(By P. G. MORGAN, Director.)

In accordance with official instructions, on the evening of the 22nd March I left Wellington in order to inspect recently prospected coal-outcrops, &c., near the Liverpool State Coal-mine, Greymouth. Being detained, owing to the late arrival of the steamer, for two days in Christchurch, I called on Mr. Suter in order to discuss palæontological work, and made a visit to the important geological locality of Weka Pass, near Waikari. On the 25th March I arrived at Greymouth, and next day, accompanied by Mr. I. A. James, General Manager of the State Coal-mines, visited the various bores lately drilled in the neighbourhood of the Liverpool State Mine. The 27th and 28th March were spent with Mr. James in inspecting the country and the coal-outcrops north and north-west of the Liverpool Mine. On the 29th I examined the rock-outcrops seen on the main haulage-road from the Liverpool Mine to Rewanui, and on the railway-line thence to Dunollie. Next day I returned via Christchurch to Wellington, which was reached on the morning of the 31st.

## BOREHOLES.

The results of the boring lately undertaken are very satisfactory, and show that the lowest known workable seam of the field, called in New Zealand Geological Survey Bulletin No. 13\* (p. 98) the "A" seam, is of great thickness and good quality beneath the watershed of upper Seven-mile Creek. As stated in Bulletin No. 13 (p. 98), this seam can be traced by outcrops more or less continuously from the Paparoa Coal-mine towards the head of Ford Creek, and thence to the westward for over two miles into the valley of Bishop Creek. A considerable portion of the coal beneath Seven-mile Creek valley can be worked from the present haulage-road entering the Liverpool Mine.

## RECENT SURFACE PROSPECTING.

The recent prospecting in Bishop Creek valley directed by Mr. James shows that the A seam extends 24 or 25 chains westward of any previously known outcrop, and throughout this distance exhibits from 18 ft. to 20 ft. of perfectly clean hard coal. A reversed fault then causes the seam to be downthrown 150 ft. to the west. Beyond this point the A seam has not been traced, but an upper seam stated to be 9 ft. thick has been followed for 10 chains.

Somewhat to the south, in the valleys of Cascade Creek (probably a tributary of Bishop Creek) and of Miller Creek (a tributary of Ten-mile Creek), two apparently workable coal-seams are exposed, and have been prospected at various points. As a rule, from 5 ft. to 7 ft. of clean hard coal is seen. The lower of these seams probably corresponds to the 9 ft. seam previously mentioned as found in the valley of Bishop Creek. The upper, not improbably, is a split.

## GEOLOGICAL RELATIONS.

Immediately east of the area lately prospected is a zone of disturbed and more or less faulted country, which strikes north-north-east and extends down the valley of Spring Creek. East of this is a narrow belt of more solid country, but this soon gives place to the highly disturbed zone traversed by the Tararu fault.† The reversed fault previously mentioned can be traced south-south-west into Miller Creek valley, where it is indicated by a belt of steeply dipping rock, and may no longer be a reversed fault, but the effect is still the same—namely, a downthrow to the west. The block or belt of solid country has considerable length, and probably widens to the south-south-west, owing to the last-mentioned fault diverging more to the west than the easterly fault at the head of Spring Creek.

At the outcrops in Bishop Creek valley, in Cascade Creek, and in Miller Creek the dips shown by the coal-seams and the enclosing rocks are moderate. It may therefore be said that a considerable area of thick coal, workable as a single block, exists west of the upper part of Spring Creek. The outcrop of the A seam is approximately 1,500 ft. above sea-level, but as the coal is followed to the southward the elevation of the seam decreases. Hence the coal is not commanded by the present haulage-road to the Liverpool Mine.

## RECOMMENDATIONS.

Before the coal-bearing block west of Spring Creek is developed, a certain amount of boring, in order to prove the coal to the dip of the outcrops, is necessary. As much surface prospecting as possible ought to be done, and it is desirable to extend this over the ground outside the limits of the apparently workable block. In particular, the A seam outcrop ought to be traced westward and eastward, down and up the valley of Bishop Creek, as far as possible.

The preparation of a good topographical map on a scale of 5 or 10 chains to the inch is absolutely essential. Such a map in the course of a few years will save its cost over and over again.

The services of a geologist are required in tracing faults and disturbed zones of country, in estimating throw of faults, distance apart and number of seams, in correlating the seams, and in collecting other data of a geological character. Numerous analyses of the coal are desirable. In many cases the samples should be collected under the direction of a geologist—that is, some one with an adequate training in economic geology.

In conclusion, I wish to point out that satisfactory geological reports cannot be made as the results of flying visits. For some years the Liverpool Mine will require the almost constant attendance of an experienced geologist, or mining engineer with good geological training, if the best results possible are to be obtained.

The Greymouth Coalfield is faulted and disturbed to an extraordinary degree. The coal-seams are strikingly lenticular, and in other ways variable. Under these conditions methods of prospecting and working different from those found suitable in more regular coalfields are required, and a quite unusual degree of attention to geological factors is imperatively necessary.

\* Morgan, P. G.: "The Geology of the Greymouth Subdivision, North Westland," 1911. No. 13, 1911, pp. 47, 111.

† N.Z.G.S. Bull.