

zone of comparatively highly folded strata, traversed undoubtedly by minor faults. One of the major seams crops out in it, but, owing to the cover of slip material and vegetation, it will be impossible to follow the seam without considerable trenching.

The seams described above do not apparently live to the east of this, unless perhaps the 12 ft. seam that outcrops on the ridge 20 chains south-east from Blackball Peak (Trig. K) is the equivalent of one of them, but this seam is regarded at present as the equivalent of that to be next described.

In the easternmost of the Mount Ike sub-blocks, and in a north-flowing tributary joining Bishop Creek a mile above its junction with the Ten Mile, is a seam that has been followed for 15 chains and shows at one locality 10 ft. of coal. There is sufficient proof that this seam is separated from the underlying shales by an important unconformity, for some distance below it is a conglomerate containing well-rounded pebbles of bituminous coal up to 2 in. across. But such is the difficulty of mapping in the whole area that this break has not been definitely established elsewhere.

The section exposed in a creek flowing north from the trig at Blackball Peak shows the upper part of the basal conglomerate with a minor coal-seam and a considerable thickness of overlying shale and sandstone, but no coal-seam that could be correlated with those above described at the north end of the Hall Ridge Block. South-east from Blackball Peak a distance of 20 chains, a 12 ft. seam crops out, which, when followed south-west, thins to less than a foot within 10 chains. Eastwards it will have to be prospected to prove if it lives for any distance.

The Morgan and Kimbell seams apparently belong to horizons above those of the seams just described. Neither has been found at the north end of the Liverpool Block nor in the Mount Ike Block to the west, and possibly they do not live so far to the north, for the Kimbell seam which crops out at the junction of Carroll and Waiomo creeks when followed for 35 chains up the latter stream is found to grade into carbonaceous shale.

At the north end of the Liverpool Block, and cropping out on the ridge between Seven Mile and Bishop creeks, are two seams that each show 6 ft. of coal at one or more of their outcrops. There is no great extent to these seams, as they have been considerably denuded. They are above the horizon of the Liverpool seam, and are probably to be correlated with remnants that crop out near the ridge-top on the westernmost of the Ike Peak blocks. Other remnants of seams corresponding roughly with this horizon, and showing up to 6 ft. of coal, crop out near the crest of the ridge north-east of the junction of Waiomo Creek with the Seven Mile. Three seams in a corresponding position in the sequence show thicknesses of 3 ft., 5 ft., and 11 ft. respectively, and crop out in a tributary of Waiomo Creek that flows south from the saddle at the head of Otto Creek. Two seams of this group appear on the west of the divide at the head of Waiomo and Carroll creeks. One seam is 5 ft. 3 in. thick and the other 9 ft. 6 in., but apparently they peter out southwards, for they do not show in the southern headwaters of Waiomo Creek. These seams outcrop also in the Will Block. The seams worked in the Bins section of the State Mine correspond with the seams here described. In the strip of country averaging 15 chains across west of Will Block are some minor seams, the greatest observed thickness of any one of which is 4 ft. 4 in. They outcrop in both Carroll and Waiomo streams, and are probably lower in the sequence than the other seams here described. No coal-seams have been observed in the overlying shaly mudstones.

CONCLUSION.

The conclusions reached by Mr. Morgan regarding the small coal resources within the field and their probable depletion at no distant date are substantiated by the present season's work, no thick seams of any extent other than those already known having been discovered. They may exist at depth in areas of less extent than that in which the Liverpool Mine is at present operating, but their presence will require to be proved by deep boring. The horizons containing the thickest and most persistent seams are those now being mined. The untouched resources to-day consist of the hypothetical deeper seams, seams of lesser thickness overlying those now being extracted, and other seams which cannot economically be mined before the problem of utilizing stony seams has been solved. The amount of coal ultimately to be extracted from the Grey field will be still further diminished if the working of all workable overlying coal is not undertaken at the same time as that of the main seams.

MOERAKI SUBDIVISION.

By D. A. BROWN.

In this subdivision, which embraces the Otepopo, Moeraki, Waihemo, and Dunback survey districts, field-work was commenced on 29th November, 1937, and up till 31st March, 1938, approximately 200 square miles had been surveyed and mapped. Field assistance was rendered by Mr. O. D. Paterson, of Otago University, from 2nd December, 1937, to 28th January, 1938, and a short visit was made by Dr. Marwick at the beginning of March. The aid given by Professor James Park in the elucidation of the Hampden Series and many other problems is also gratefully acknowledged.

The survey of Otepopo and Moeraki survey districts is almost completed, leaving the greater part of Waihemo and Dunback districts to be done. These latter, however, are small districts and appear fairly simple, so that it is hoped to complete the subdivision by the end of the field season.