

higher part of Mount Sewell. Within the boundaries of the Coal-pit Heath lease, this rock is seen only to the north of the Kimberley fault, along the bank of the river, and in Mine Cliff, and over a small area towards the western end of the lease. Over the western part of the Brunner lease this sandstone is deeply cut into by various creeks, and, by a variable amount, the thickness of the cover over the coal is less than what would have to be encountered on the spurs between the different gullies.

There is a possibility of this sandstone being thicker over the western area of Coal-pit Heath and Brunner leases, but this may be more an appearance than a reality, the fall of the country and the dip of the beds being in the same direction at nearly the same angle; and it is only because the creek-beds cut deep in their upper parts that the underlying coal-measures appear as far down the slope of the range as they do. On the spurs between the various creeks the fine-grained sandstone reaches to the top of the range. In following down Back Creek to the upper boundary of Coal-pit Heath lease the fine-grained sandstone is said to be continuous; and a little below the boundary the inclination of the strata is reversed, and the dip is towards the eastward. The thickness of these beds ranges from 140ft. at Dobson's Bluff to fully 200ft. towards the western boundary of the Brunner lease.

III. *Dobson's Bluff Beds*.—Of these the lower beds are fucoidal, earthy micaceous sandstones, with irregular concretions and balls of ironstone. The middle part is no less fucoidal, but of a lighter grey colour, and contains less mica and fewer concretions of ironstone. The upper part is a moderately soft grey sandstone, divided into two members, the lower of which is massive in one or two thick beds, and the upper part forms thin-bedded flaggy sandstones with micaceous or carbon partings. The same beds appear between the top of Mine Cliff and the line of Brunner No. 1 fault, as this has been indicated on the surface by a line cut through the bush. There are, on the right bank of the river, north of the Kimberley fault, beds of similar appearance to those on the top of Dobson's Bluff; but the true position of these has now been ascertained to be under the Dobson's Bluff beds, forming part of the fine-grained sandstone formation. Half-way along the southern boundary of Coal-pit Heath lease, in Pascoe's Creek, which is between Sulky Gully and Back Creek, there are brown sandstones, evidently belonging to the higher beds on Dobson's Bluff; while west of Back Creek the underlying fucoidal beds appear in a line of cliffs on the right bank of the creek, and it may be that the same beds occur on the crests of the ridges between the creeks further to the north, towards the higher part of the range.

II. *Mudstones and Marly Clays*.—These may be regarded as conformable to the Dobson's Bluff beds. They extend over the low grounds between the outcrop of the Dobson's Bluff beds and the east slope of the limestone range stretching along the coast-line from Point Elizabeth to the New River watershed. In consequence of the Kimberley fault having a down-throw of 180ft., the mudstones extend over the whole of the Taylorsville Flat, and across the river till met and cut off by the Dobson's Bluff fault, trending north-east and south-west.

West and south-west of Mine Cliff these beds are found on the east side of the Brunner No. 1 fault, to nearly abreast of the main level of the Brunner Mine. Where the southern boundary of the Brunner lease crosses Sulky Gully, the mudstones for a short distance reach on to the lease, but over the northern and western parts, these rocks are not known to be present. They are present over the greater part of Coal-pit Heath lease. These rocks are readily distinguished from those next underlying, and where they are absent it may be considered that the coal lies at a moderate or reachable depth from the surface. On the southern side of the river these beds overlie the Dobson's Bluff beds, and beneath the valley gravels are the first beds to be met with within the Township of Dobson. They are of great thickness, and, to the westward of more than one-third of a mile from the outcrop of their lower beds, the depth to the coal should be very considerable.

I. *Cobden Limestone*.—These beds lie outside of the special district examined in connection with this report, and have no important bearing on the various subjects discussed herein.

The lowest beds of the sequence, the "Lower conglomerates," over the region described, consisting of well-rolled sandstone gravels, indicate a source distant from where they are now found; and having their chief development showing the greatest thickness on the higher part of the Bald Hill Range, probably the whole of the Paparoa Range have as a chain of mountains arisen or been upheaved since the deposition of the coal-bearing portion of the sequence. We have thus to regard the special area under consideration as forming but part of a much larger and greatly extended area, over which different members of the Cretaceous-tertiary series were deposited, and, without doubt, the lower part of the series embracing the coal-measures and underlying conglomerates. This is made abundantly clear by a study of the sequence in part, or in its entirety, at many localities on the west coast of the South Island. By the time the lower grits and sandstones had been deposited, and the beds laid down over which the coal-forming material accumulated, there seem to have been wide areas of comparatively level land at no great height above sea-level, on which grew and accumulated the material of the future coal-seams. Fluvial beds, to a thickness of from 60ft. to 100ft., covered up the carbonaceous accumulations, and then at all points it is generally evident there was depression of the land, and thick deposits of marine strata were formed above those of a more terrestrial character. The gradual sinking of the land continued, without any reversal of the process, till the Cobden limestone and the highest beds of the sequence were deposited.

FAULTS.

The only faults that have come under our consideration are situated near the Grey River. These are exposed in the mine-workings, or indicated at the surface on both banks of the river. Faults, however, may abound in other parts of the leases held by the Grey Valley Coal Company, and are almost certain to exist where they cannot be traced on the surface, and where as yet mine-workings have not reached. Over the western parts of the Brunner and Coal-pit Heath leases the