

3. GENERAL GEOLOGY.

The coal, which is sub-bituminous in quality (generally known as "lignite" in New Zealand, but "sub-bituminous" according to recent approved classification), occurs in seams from 3 ft. to 8 ft. in thickness, interstratified with a great series of conglomerates, sandstones, claystones, and impure limestones. These rocks, which extend over a great portion of the west coast of the North Island, are Tertiary in age, and are generally considered to belong to the Miocene division of that era, or may possibly be earlier.

In the area now being described, these beds lie almost horizontally, or dip with very gentle inclinations in southerly or easterly directions. The beds have been apparently widely dislocated by earth-movements, but the faults thus caused are mainly of inconsiderable throw. Naturally, the coal-beds have been disrupted with the enclosing rocks. For this reason it is as yet impossible to say whether the several coal-outcrops examined belong to more than one seam, or to one seam only. From a consideration of the generally similar quality of the coal in the various outcrops, from the constancy of a bed of conglomerate closely overlying the coal-seams, and from actual faulting phenomena observed in the field, it is thought, however, that there is only one seam. The floor and roof of the coal-seam consist everywhere of claystone, which is sometimes separated from the coal proper by carbonaceous shale. The coal-bearing beds are overlain in many places by loosely consolidated tufa, whilst elsewhere recent gravel-beds occupy the floors of the narrow valleys.

4. DETAILED DESCRIPTION OF THE SEVERAL COAL-SEAMS.

(a.) **TYLEE'S SEAM.**—Tylee's seam is situated on the property of Mr. A. B. Tylee, and is exposed on a small right-hand branch of Tylee's Creek, a tributary of the Retaruke. There are nearly 8 ft. of coal altogether, but a 3 ft. band of stone appears, which divides the seam into two parts, the upper 3 ft. thick and the lower 4 ft. 10 in. thick. The seam dips at an angle of 8° in a south-east direction. Measured from top to bottom, the upper part of the seam consists of 1 ft. of poor coal containing carbonaceous-sandstone layers, and 2 ft. of good coal, while the lower part is made up of 6 in. of carbonaceous shale with coaly partings, 1 ft. 2 in. of good coal, 2 in. of carbonaceous-sandstone parting, and 3 ft. of good coal.

It will thus be seen that there are only 6 ft. 2 in. of good coal. The general quality, including much carbonaceous shale and sandstone, of the upper portion (A) and the lower portion (B) is given below :—

	A.	B.
Fixed carbon	32.27	28.85
Volatile hydrocarbons	36.98	37.47
Water	12.20	14.21
Ash	18.55	19.47
	100.00	100.00
Sulphur	3.15	2.64

If the seams were picked free of all shaly or stony bands the amount of ash would be considerably less than that given in the analysis.

(b.) **INVERARITY'S CREEK.**—The seam near the head of Inverarity's Creek, a fairly large tributary of the Retaruke, shows about 2 ft. thick at the outcrop. The coal is much weathered, but appears to be of fair quality. The seam is probably of much greater thickness than the 2 ft. showing, but is so covered with débris that it is impossible, without a great deal of work, to expose the whole width of it, nor was it possible at the time of examination to determine the strike and dip. The altitude is 2,304 ft.

(c) and (d). **LONGRIDGE NOS. 1 AND 2.**—These two seams are on a high ridge above the heads of two small creeks which enter the Retaruke about 10 and 15 chains respectively above Inverarity Creek. The two outcrops are only about 7 chains apart, and are probably both exposures of the same seam. They are so covered with débris that it was not possible to arrive at their extent or dip. The approximate altitude is 1,946 ft.

(e.) **PADDY'S CREEK.**—A seam 7 ft. 8 in. in thickness is exposed in Paddy's Creek, a very small tributary on the right-hand side of the Retaruke. A good deal of work was done on this outcrop to free it from débris and to get a clean face for sampling; but even with this care the sample would undoubtedly contain many impurities in the silt deposited along the laminae near the surface, which would not be shown further in. Measured from top to bottom, the seam is made up of 2 ft. 4 in. of fair coal containing two $\frac{1}{4}$ in. clayey selvages near the top, 3 in. of a highly carbonaceous shale with coaly partings, 11 in. of fair coal, 3 in. of a carbonaceous shale, 2 ft. 8 in. of good coal, 6 in. of shale containing a good deal of clayey material, 6 in. of good coal, 3 in. of a puggy seam, and shale to the claystone floor.

The seam, which is at an altitude of 1,955 ft., dips at a very slight angle in a south-easterly direction. Its general quality is as follows :—

Fixed carbon	34.48
Volatile hydrocarbons	37.00
Water	15.10
Ash	13.42
	100.00
Sulphur	2.40

Had the coal been picked free from stone, the quality would have been considerably better than shown by the above analysis.