

Northumberland Straits Tunnel.

The upper sandstone bands in no. 4 are probably as well defined as any other sandstones in the whole series. They bear the same characteristics as the sandstone beds of no. 5. We have these last well exposed on the shore section at cape Traverse. In figure 3, I have given a section of the upper half of no. 5 as it appears in following its strike carefully for three miles. In that distance the sandstone is changed three times into extensive deposits of shale. The same is probably the case with the sandstone bands of no. 4.

In figure 4, I have given a section of part of the calcareous based in no. 5. This shows its irregular and complex structure.

Indeed the minor bands of this series have no sort of continuity. The great shale beds are persistent and uniform but the small arenaceous or calcareous deposits which occur in them are local, lenticular and discontinuous, and not likely to form leads for water. The great shale beds no. 1 and 3 are found continuously over an extent of more than 100 miles along the basin of the strait, and compose the great bulk of the mass of the strata of the lower Permian. They are much more extensively developed fifty miles to the eastward than they are at the capes crossing. These shales are impermeable to water. Their surface always affords the water beds of the system on which the underground drainage accumulates until it finds an outlet. Bed no. 1 was partly penetrated by a well on Jourmain island. A small quantity of water lay on the top of it affording a weak spring, but not a drop accrued in its mass for the depth of 36 feet which it was penetrated, and in well digging this is always found to be the case where these shales are penetrated.

The carboniferous base of sandstone will probably form a dangerous source of water and it should be avoided, but as already remarked it does not break up under the bed of the strait here.

It is my duty to state that, though convinced of the accuracy of what I now present, a more minute and detailed geological investigation should be made before active engineering operations are begun.

I have the honour to be, sir, your obedient servant,

FRANCIS BAIN.