

on the other; but whether the coal is actually absent at this particular spot, I was not able to ascertain, solely from want of proper casing-pipes to allow of my going deeper. The irregularity may only prove, after all, to be an ordinary fault or dyke. Owing, as I said before, to my not having tubes, I was obliged to abandon this hole also. The top measures were so soft, and the lower ones so hard, that the hole could not be kept open to allow of further progress without being secured.

At this juncture (the end of July), after placing the work in the hands of my nephew, giving him sufficient instructions and work to go on with during my absence, I resolved to proceed to Auckland, with a view of suggesting to the Engineer-in-Chief the propriety of at once getting some pipes. It was ultimately, in order to save expense, agreed upon to get some tin pipes made, having used such very successfully on different occasions in England; but the measures there were more favourable than those at Kawa Kawa; the soft sandstones at the latter place are much softer, and besides contain larger feeders of water than do the English measures. The hard sandstones here are similar to those of England, being compact and possessing an equal amount of resisting power; hence the difficulty in keeping back the soft sandstones of the top measures during the process of boring in the hard measures below, the vibrations of the rods assisting to loosen the soft beds above.

On my return to the coal field in September, my instructions then were altered as to the extent of future operations, viz., that instead of 500 acres I was requested to prove only 250 acres, and that with as little delay as possible, and with the least possible expense, as the funds voted for the exploration of the field were getting low, which of course necessarily altered my original plan of operations, inasmuch as I was obliged to reduce the intended number of holes, the result of which would tend to increase the difficulty in proving the coal at the required points. On my arrival at Kawa Kawa, after an absence of about five weeks, I found that the instructions which I had given my nephew had been practically carried out, and that Nos. 5, 6, 7, and 8 holes, as marked on the plan, had been commenced, and carried down 113 feet, 85 feet, 22 feet, and 28 feet respectively, and then abandoned; the two first for want of casing-pipes, and the two latter for want of proper tools to clear the holes of projections of hard rock.

The hole marked No. 9 on the plan was in operation on my arrival, but the position being so low, and in consequence of there being so much wet weather at the time rendered the measures so "quick" and dangerous, that I was obliged at a depth of 70 feet from the surface, to abandon it, being afraid of losing both pipes and boring rods. I then removed about 65 yards from the swamp to higher ground, and started No. 10 hole, where the indications for coal continued to be most favourable up to the time of my leaving the work.

I may here mention that, at the commencement of the work, the tools and materials put into my hands were not at all fitted for the requirements of the work we had to perform; the set was not at all complete, being an odd lot, consisting of a few of one kind and a few of another. We had the greatest difficulty, and much unnecessary labour and time was expended over them in making alterations and repairs from time to time, to make them in any way fit for the purpose, which of course added very materially to the boring expenses, and more especially as we were in such an isolated place. The only drawback to complete success in proving the field was the want of proper boring apparatus; and although the sum already expended may appear to a casual observer large, yet, taking everything into consideration, it is not quite double that of the cost in England for work of the same kind, and for a like amount of work done.

If I had been at first supplied with a proper set of boring tools, the cost would not have much exceeded the prices paid in England. I may further add that the Kawa Kawa Coal Field has not yet been sufficiently examined to warrant my giving a decided opinion as to its value or capabilities, and to illustrate or report fully upon the peculiar structure of the country, the internal arrangements and superposition—viz., to ascertain the "dip" and "strike" of the strata, the size and course of "faults" and dislocations—all of which are absolutely necessary before any attempt at sinking shafts can be made; therefore careful and accurate plans and sections are essential and important to show the position and inclination of the coal.

It is, in fact, necessary to have a comprehensive picture before the eye of all prominent natural features of the property, both above and under ground, as far as they can be possibly ascertained, before anything of a permanent nature can be safely attempted.

It must therefore be evident to all having the slightest knowledge of the mineral structure of the earth, that, in places where exploration has never before been attempted, and more especially where volcanic action has previously existed, great difficulties sometimes present themselves in conducting the necessary operations in such exploring expeditions. Hence the necessity of a very careful examination of the stratification by borings or sinkings. And although I have not succeeded in proving a sufficient area of coal to enable the Government to lease any portion of the Kawa Kawa Coal Fields, the cause being simply a want of proper tools to carry out effectually the necessary operations, nevertheless I am of opinion that coal exists in sufficient quantities and of a very superior description, and of an unusual thickness, to justify the Government to make further trial.

The coal is, in my opinion, suitable for steam, house, gas, and smiths' purposes, and besides it is a good coking coal. I am also of opinion that this coal field contains more than one seam of coal, and that it extends a considerable distance, especially in the direction of Whangarei. It may not be continuous or unbroken, as there is every appearance of the whole district having been more or less disturbed by volcanic agency.

I have, &c.,
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