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GOVERNMENT GEOLOGIST

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ON COAL AT MOUNT REX.

(One map.)

Government Geologist's Office,
Launceston, 28th April, 1905.

SIR,

ACTING on your instructions, I proceeded to Mount Rex on the 16th ultimo, in order to examine the recently reported occurrence of coal in that district. A discovery of seams situate in the Parish of Malvern has been made by Mr. James Stevenson, at a distance of about $\frac{3}{4}$ mile south and south-east of the Mount Rex Tin Mine, and 5 miles north-west of Avoca in a direct line. A section of 160 acres, 201-m, has been taken up by Mr. James Stevenson, and mining rights have been acquired on the adjoining freehold of Mr. H. R. Falkiner, 3680 acres. The present way of approach to the field is along a fairly level road from Avoca, on the western side of the Castle Carey Rivulet for three or four miles, and then up the road to Mount Rex for a couple of miles, as far as the Black Pinch, when a turn to the south is taken just west of Mr. McCarthy's farm boundary. The journey can be easily made in one and a half or two hours from Avoca Railway Station. If the seams are developed, and a permanent coal-field springs up here, the outlet will be down the valley of Buffalo Creek to Avoca.

The Avoca township is on Tertiary basalt, and the road for some distance on the west side of the Esk River traverses Tertiary sediments. But further on, the Mesozoic trap-rock or diabase prevails, giving place to Permo-Carboniferous sandstones. The road up Mount Rex is on the western side of a valley which is along the contact of the sandstones and diabase on the west with the granite on the east. At the Black Pinch a diabase (greenstone) hill occurs to the west of the road, and at the southern end of this hill two seams of coal have been discovered in sandstones of Mesozoic age.

In Tasmania it is not practicable to divide Mesozoic strata in the same way as is usual in Europe; but these upper coal measures probably correspond as nearly as possible with the Jurassic or its equivalent in other parts of the world. In Tasmania they are everywhere pierced by eruptive diabase rock, which at the contact tends to

make the coal brittle and hard. Owing to detritus, the actual contact is rarely seen, except where dykes traverse the sandstone, and the present position of the denuded eruptive mass at the crown of the ranges always impresses the casual observer with the idea that the sandstones with their associated coal seams pass beneath it. Without denying the possibility of this in certain cases, it must be said that its occurrence has not yet been demonstrated; while, on the other hand, several instances are known of coal measures being cut off by the trap-rock; and bore-holes in the sandstone have frequently penetrated to the underlying trap.

At the south end of Greenstone Hill a drive has been put north-west into the hill for about 50 feet on a seam of coal said to be 6 or 7 feet thick. The approach has fallen in, and I could not examine the seam. I was told that it was soft at first, but developed into solid coal when further in. At surface loose stones of diabase greenstone are scattered through the soil. These have been derived from the hill higher up. I think it quite possible that in extending this tunnel, say, some 500 or 600 feet further the solid diabase would be met with, unless, of course, the sandstone passes beneath it, as mentioned above. The seam could, however, in any case be followed round the contour of the hill, and would yield a lot of coal, though my fear would be that, as it is apparently so near to where the diabase may be expected, it would never get much weight upon it.

Four or five chains south-west of this, and 90 or 100 feet lower, a 12-foot seam of coal has been discovered. This was the first discovery, and a drive was put in on the upper part of the seam for upwards of a chain; but it has fallen in, and I could not see this particular drive. However, a tunnel has been driven upon the seam a few yards to the west for a distance of 150 feet. This tunnel averages 10 feet in height by 6 feet in width. Its direction is 10° west of north; and the dip of the seam is to the west, at an angle of 10° from the horizontal. The level or drift has been carried horizontally across the dip of the beds, and the whole vertical thickness of the seam has been extracted from sole to roof. The seam is displayed well and continuously all along the drift for an average thickness of 10 feet. A hole which I had sunk in the floor about 20 feet behind the face showed the seam to within a few inches of 12 feet thick in all. I was told it had

been measured to 12 feet. The section near the face and on the east wall of the level was as follows, in descending order:—

	ft.	in.
Coal	3	0
Band of white clay	0	6
Coal 5 inches to	0	6
Clay band	0	2
Coal	1	2
Band ½ inch to	0	1
Coal	1	9
Band, variable	0	0½
Coal	0	7
Thin band, inappreciable	—	—
Coal	4	0
Total	11	9½

I could not examine the last foot or two of coal in section as the water drained into the hole sunk, but the quality was quite equal to that exposed in the level. In the face the two upper bands are coming together closer, being only 3 or 4 inches apart. On the west side of the level, too, the bands seem to be thinning, and some of the thinner ones have died out altogether. If there is any difference at all in the appearance of different parts of the seam, the lower part is the sounder; but all through the seam consists of solid, marketable coal. Inside the entrance to the level a peculiar occurrence is noticeable. The lower part of the seam is invaded by sandstone, leaving the upper 3 feet and band unaffected. The fact that the upper part is untouched proves that there has been no faulting or other disturbance, and I think the proper interpretation of it is that a roll or even a more decided unevenness or drop of the floor takes place at this point. It occurs at the entrance itself, and does not prejudice the part of the seam in which the level has been driven. Several tons of good quality coal are lying outside the mouth of the tunnel. Some of this heap has been used in the furnace at the Mt. Rex Mine.

The line of contact between the sandstone and diabase ahead of this tunnel is not visible, being concealed by detritus from the eruptive rock, which tends to make the contact seem nearer than it really is; but it is probable that after further 10 to 20 chains have been driven north the drive would be in the neighbourhood of the junction, and the much debated point of whether the coal measures pass below the diabase or not would be on a fair road to settlement.

About $\frac{1}{2}$ mile further west, and 140 feet lower down, is a shaft which has been sunk on what appears to be the same seam outcropping at surface. Its section, in descending sequence, is:—

	ft.	in.
Coal	3	0
Clay band	0	4
Coal	0	9
Band	0	2
Coal	3	2
Band	0	1
Coal	0	6
Band	0	0 $\frac{1}{2}$
Coal	3	7
Clay bottom	—	
Total	11	7 $\frac{1}{2}$

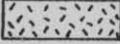
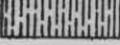
It will be remarked that the main features of the seam correspond fairly well in both the tunnel and this pit, viz., 3 feet of top coal, 3 feet of coal in the middle of the seam, and nearly 4 feet in the bottom part. On the other hand, the seam in the pit is horizontal, while in the tunnel it is dipping at an angle of 10°; the difference may be due to local weighting, or the dip at the eastern end of the field may very well be caused by the strata there being at the edge of the basin where it ends against the granite range.

The first thing to be done in this field is to test the extension of the seam or seams; and having determined them to be continuous and free from faulting, a few tons should be got out and placed for practical trial. Then the matter of connecting the field with the Government railway can be taken in hand.

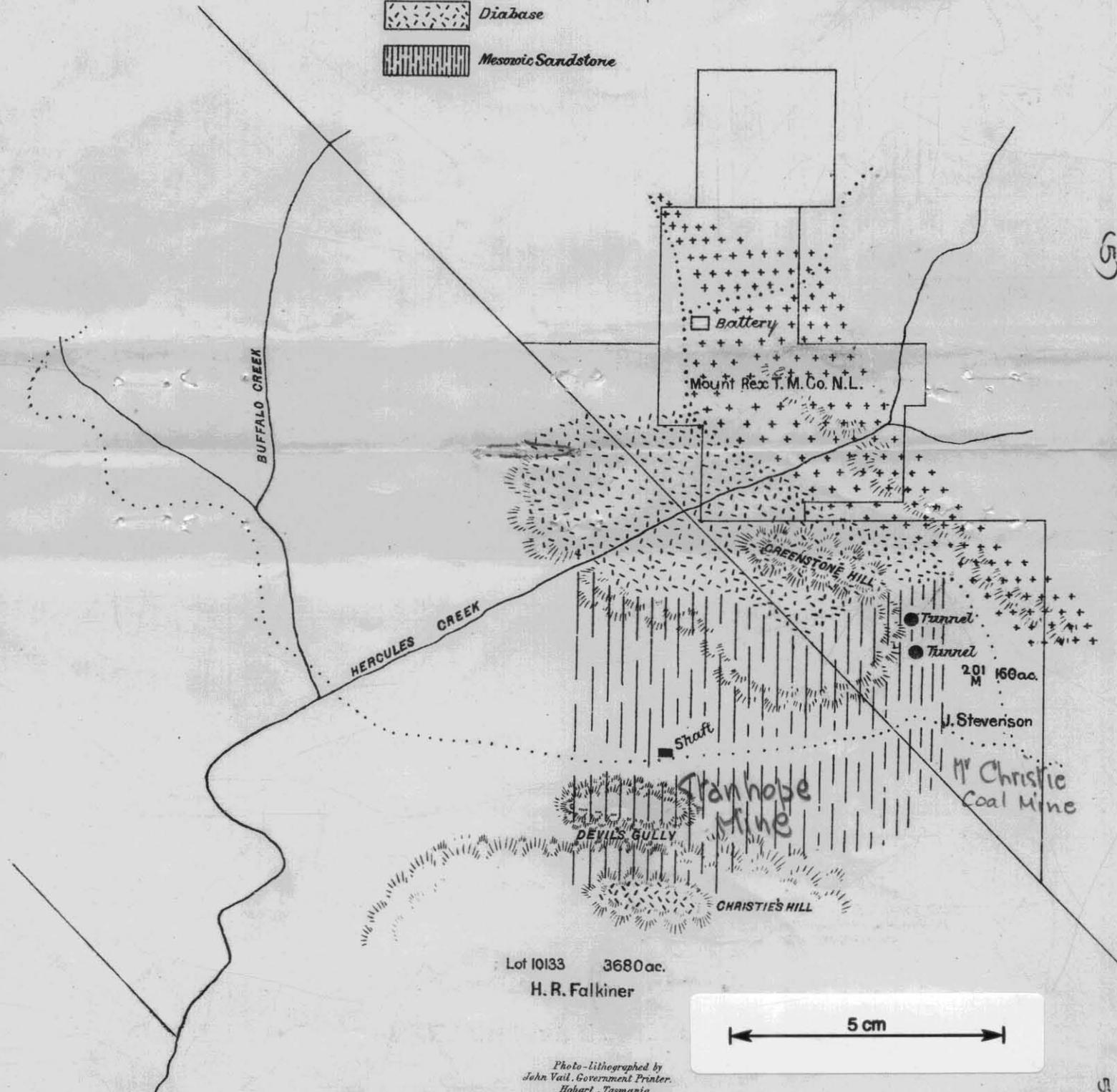
A sandstone flat occupies the valley between the two diabase-crowned ridges of Christie's Hill and the Greenstone Hill, but between the former and the flat there is a lower ridge of sandstone. The flat ground nowhere exceeds a height of 100 feet above the coal seam at the shaft, and is for the most part less than that, so that testing the seam in the valley even by means of shafts, would be comparatively easy. It is not likely that much water trouble will be met with, as the underground drainage will follow the coal seam to its outcrop lower down the valley. A couple of shafts on an E-W line would be sufficient on the flat. To test the ground along the north side of the valley up on the southern flank of the hill, between the shaft and the tunnel, it would be best to resort to boring with a core drill; a heavy plant

SKETCH MAP OF M^t REX COAL-FIELD

Scale 10 5 0 10 20 30 Chains

-  Granite
-  Diabase
-  Mesozoic Sandstone

W.H. Twelvetrees
Government Geologist
19th April 1905



5 cm

Photo-lithographed by
John Vail, Government Printer,
Hobart, Tasmania.

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would not be required. The boring will be easy work, but some way of bringing water on the ground will have to be devised. While the drill is on the spot it might be advisable to put down a hole lower down the valley, to ascertain whether other seams do not exist below the present one, and in situations nearer to the Fingal Railway line.

The outlet for this coal-field will be down the valley of Buffalo Brook to Hanleth, on the Avoca-Conara line, and once production here is established there is no doubt that this, and not the Avoca route, will be the egress for Mt. Rex and Ben Lomond traffic. The distance to Hanleth station along a route which would be followed by a tram or railway-line has not been ascertained, but it is thought it will not exceed 7 miles, and most of this is easy grade. The steepest gradient will be shortly after leaving the mine. The height (barometric) of the coal shaft above Hanleth station is about 650 feet.*

From the felspathic nature of the sandstone, the thickness of the seams and quality of the coal, although so far I have seen no fossil plant impressions, I entertain no doubt that the seams belong to the upper coal measures in Tasmania, and indeed to the same great series of coal-bearing strata which flank Mt. Nicholas and other mountains in the eastern part of the island.

I had average samples of coal broken down from the upper and lower parts respectively of the seam in the tunnel; and these, assayed by the Government Analyst, Mr. W. F. Ward, gave the following results:—

	Fixed Carbon.	Volatile Matter.	Ash.	Sul- phur.	Mois- ture.	Coke.
Upper part of Seam	54.5	35.0	8.5	0.8	1.2	Firm
Lower part of Seam	55.0	28.2	15.1	..	1.7	Firm

Mr. J. D. Millen, F.G.S., of the Mt. Bischoff Smelting Works, assayed a sample for Mr. Stevenson, the result of which I am permitted to quote. For comparison I place these analyses in juxtaposition with standard analyses of samples (taken by Mr. M. J. Griffin, Inspector of Mines) from the Mt. Nicholas and Cornwall seams; not, however, with the intention of saying anything depreciatory in respect of the coal from any colliery nor setting off one against the other, but to show that notwithstanding minor variations, which may exist even in different

* Determined with a Hicks' mercurial barometer.

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parts of the same seam, all of them belong to a series of deposits which must be considered as geologically identical.

	Fixed Carbon.	Volatile Matter.	Ash.	Sulphur.	Moisture.	Coke.
Mt. Rex (J. D. Millen)	52.90	38.20	8.90	Good and firm. Gas properties profuse.
Mt. Rex (W. F. Ward)	54.50	35.00	8.50	0.80	1.20	Firm.
Mt. Rex	55.00	28.20	15.10	...	1.70	Firm.
Cornwall	55.00	31.02	9.56	0.56	3.56	No coherent coke.
Mt. Nicholas	57.50	28.40	9.28	0.54	4.28	ditto

These analyses confirm the conclusions derived from geological considerations, which point to the Mt. Rex seams belonging to the same series as those on Mt. Nicholas. The Mt. Rex coal, however, forms a good firm coke in the laboratory, and the gases will in normal samples probably range from 35° to 38°. The proportion of ash in one of the samples is rather high, but may possibly be accounted for by some of the band material being included. Broadly, the coal contains about the same proportion of fixed carbon as the Nicholas varieties, but more volatile matter, and normally, I think, will be found to run about the same in ash.

Mr. Mark Ireland, manager of the Mt. Rex Tin Mine, reports that a trial of the coal was made at the mine, but that it was unfortunately mixed with bands. If the coal were delivered properly sorted, he says it would prove to be a good steaming coal.

An important feature in the analyses of this coal is its coking property. This, Mr. Arthur Green, Secretary of the Launceston Gas Co., informs me, has not yet been observed in the coal of the Mt. Nicholas series. If this property is maintained in larger tests, a very satisfactory fact will have been established. The percentage of sulphur present is less than that in the Greta, and some other of the New South Wales coals, and is also not so large as in many British gaseous bituminous coals. The percentage of volatile matter is sufficient for a gas coal, and with a few units more it would have made an excellent coal of that description: the deficiency in this respect is so slight, that it would be worth while submitting a sufficient quantity for trial. A few tons ought also to be got out and tried for steam purposes on the railway and on the river steamers. Greater confidence could be placed in the results of such trials than in conclusions drawn from

a few analyses in the laboratory. But the analyses, as far as they go, decidedly support the opinion that the coal is of a quality well suited for both steam and domestic purposes. When tried even on an open hearth, I noticed that after a very little preliminary crackling, it burned freely and quietly, emitting considerable heat, coking visibly, and giving out a fair quantity of gas with a tolerably clean flame.

The discovery of this powerful seam at Mt. Rex is certainly geologically interesting, and may prove important even outside the question of its own economic value, for it indicates the possibility of the extension of coal-bearing strata still nearer to Conara. The diabase-topped hills which continue north of the railway westwards may carry coal-seams wherever these Mesozoic sandstones occur on their flanks. On the west side of Buffalo Brook, opposite the coal-shaft, I could see the precipitous diabase face of the range known as the Black Rock, but at that distance I could not identify any sandstones which might possibly be at its base. It is quite possible that the valleys indenting the broken country to the west may expose coal measures hitherto unsuspected.

Of one thing I am convinced, viz., that the possibilities of the country along the Fingal line with respect to coal are by no means exhausted by the known discoveries. The line runs through a large coal-field, which, though here and there interrupted by igneous rocks, contains numerous strong and persistent seams which are known at certain points, but which are also almost certainly existent in other parts of this extensive area. The local demand for coal is not yet sufficient to support the existence of large collieries in addition to those already at work, unless some advantage is offered in respect of quality or cost. But any improvement in these would result in increasing the present demand, and favourably affect the prospects of a shipping trade. Discoveries like that at Mt. Rex may be considered as tending in this direction.

I have the honour to be,

Sir,

Your obedient Servant,

W. H. TWELVETREES,

Government Geologist.

W. H. WALLACE, *Esq.*,

Secretary for Mines, Hobart.

JOHN VAIL,

GOVERNMENT PRINTER, TASMANIA.