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TO THE

K128

F.M.S. GOVERNMENT GAZETTE,

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FEDERATED MALAY STATES.

REPORT ON THE ENGGOR COAL-FIELD.

By J. B. SCRIVENOR,
Geologist, F.M.S.

[Sketches and maps referred to in the Report not printed.]

1. The coal was found in a shallow well on agricultural lot 1,701, mukim Kota Lama Kanan, near Enggor, close to and north of the high-road between Kuala Kangsar and Salak North, and between the 28th and 29th milestones. The lessee of this lot is a Chinaman named, I believe, Hok Hin Hoh, of Salak North, who has planted it with rubber.

2. When the coal was found the lessee took a piece to Kuala Kangsar and obtained permission to put down pits. These pits were valuable for the information they gave, but not one of them penetrated through the coal-seam, therefore they did not determine the thickness of the seam.

THE COAL-BEARING STRATA.

3. The best sections of the coal-bearing strata were obtained from the shaft and from pit W (sketch-plan 3). Pit X, beyond the north boundary of the lot, gave a 54 feet section in beds above the coal-seam. The information from these three sources shows a succession of surface wash with pebbles of quartzite, light sandy shales and sandstone, grey shale, coal, shale and calcareous shale. The coal thickens towards the north. In the shaft it is two feet thick. In pit W there is eight feet of coal with a shale parting of $1\frac{1}{2}$ feet.

4. The pit X reached 54 feet and had to be abandoned then on account of heat and bad air. To reach the coal it would have to be sunk to 100 feet at least, and as in the other pits the greatest depth at which coal was reached was 42 feet from the surface, there is a small break in the record. Moreover, the bottom of the calcareous shales has not been reached yet, and I doubt if any expenditure in this direction would be advisable, since the calcareous matter is not a usual feature of coal-bearing strata and points rather to marine conditions unfavourable for the formation of coal. A thin band of chalybite (iron carbonate) was found near the coal in the shaft. It was stated to be above the seam, but I did not see it before the shaft-wall was covered with planks.

5. The following is a section of the surface and coal-bearing strata on lot 1,701:

- About 4 feet of surface wash with quartzite pebbles;
- 50 feet of light sandy shale and sandstone (in pit X);
(8 feet unknown);
- 38 feet of grey shale, a thin band of chalybite (in shaft);
- 4 feet of coal (in pit W.);
- $1\frac{1}{2}$ feet of shale (in pit W.);
- 4 feet of coal (in pit W.);
- 30 feet of shale and calcareous shale (in shaft).

GEOLOGY OF THE NEIGHBOURHOOD OF THE SEAM.

6. The discovery of this coal and its resemblance to the coal mined by Malayan Collieries, Ltd., in Selangor, led to field-work with a view to determining how far the coal-bearing strata extend, and, therefore, over how great an area prospecting for coal could be recommended. The results of this work are given below.

7. The map (1) is portion of a topographical survey map of the Perak River Valley, on the scale of $1\frac{1}{2}$ inches to a mile. The country comprised in this map is formed of old sedimentary rocks—namely, shale, chert, and quartzite, into which granite has been intruded. There are numerous exposures showing these rocks, and in the neighbourhood of Enggor the evidence shows that there is very little chance of finding a large area of coal-bearing rocks. Information has been collected over a wide area, but for present purposes attention can be confined to the area enclosed by the Perak River from Kuala Plus, just above Kg. Jawang, to the Pontoon Bridge, and by a line due east from the Pontoon Bridge to the edge of the map.

8. It was hoped that the coal-bearing rocks might be found to extend a long way to the north. On the surface at Enggor Railway Station, and in several localities to the north, a fine-grained sandstone was found, which resembles certain Tertiary sandstones I have seen in Brunei. It was necessary, first of all, to determine whether this belonged to the coal-bearing series or not, because if it did a large area could be marked for prospecting. Bores were put down, therefore, at Enggor Station and on a Malay estate near by, and the

sections in the Perak River examined, with the result that it was proved that the sandstone is alluvium lightly cemented and overlying gravel, which in its turn rests on granite. This alluvium is not shown on the map as it covers everything, apparently; the surface-wash mentioned above being, I believe, part of it. It is alluvium deposited by the Perak River when at a higher level than now.

9. Granite outcrops at Kg. Jawang, in several places in the Perak River and on freshly cleared land west of Kg. Jawang. The northern part of the area is, apparently, all granite covered by alluvium.

10. In the southern part of the area, granite outcrops at Kg. Lubok Chapin and along the road to Salak North between the 27th and 28th miles. Near the 28th mile the granite gives place to old sedimentary rocks which continue to Salak North. The boundary of the granite in the Kota Lama hills has not been mapped exactly. The country around Salak North (outside the limits of this map) is granite and old sedimentary rocks.

11. As in the case of the Selangor coal-measures, the high percentage of moisture and volatile matter in the coal, the undisturbed nature of the shales, and the absence of secondary minerals in them, show that the coal-bearing strata are younger than the old sedimentary rocks. The coal-bearing strata, therefore, cannot be expected to extend underneath either granite or old sedimentary rocks, and if it can be shown that on the surface a patch of the coal-bearing strata is entirely surrounded by granite and the older sedimentary rocks, then bores put through the coal-bearing strata to the older rocks beneath, and the area of the outcrop, will give the total cubic capacity of the patch, and sharply determine its limits.

12. It is unnecessary to discuss the history of these coal-bearing strata at any length, as that has been done in the case of the Selangor beds, which I have little doubt are of the same age. The patch near Enggor is the remains of a once extensive deposit, now denuded away, that covered the granite and old sedimentary rocks. The patch rests on the latter, as far as is known at present, and leaving out of consideration the country on the west, where padi-fields and swampy ground hide all information, it is surrounded by these older sedimentary rocks.

13. The surface on which the coal-bearing strata were deposited was probably irregular, and as one patch has escaped denudation it is quite likely that others may have escaped also. I have not found any evidence of them but it is impossible to prove their non-existence without incurring considerable expense on prospecting-work. The most likely country for such patches is low-lying country where denudation is gentle. On the slopes of the high-hills there is little chance of finding them, but the first glance over the country lying to the north of Kg. Padang Bala (left uncoloured on map No. 1) makes one suspect that there may be more coal-bearing strata there.

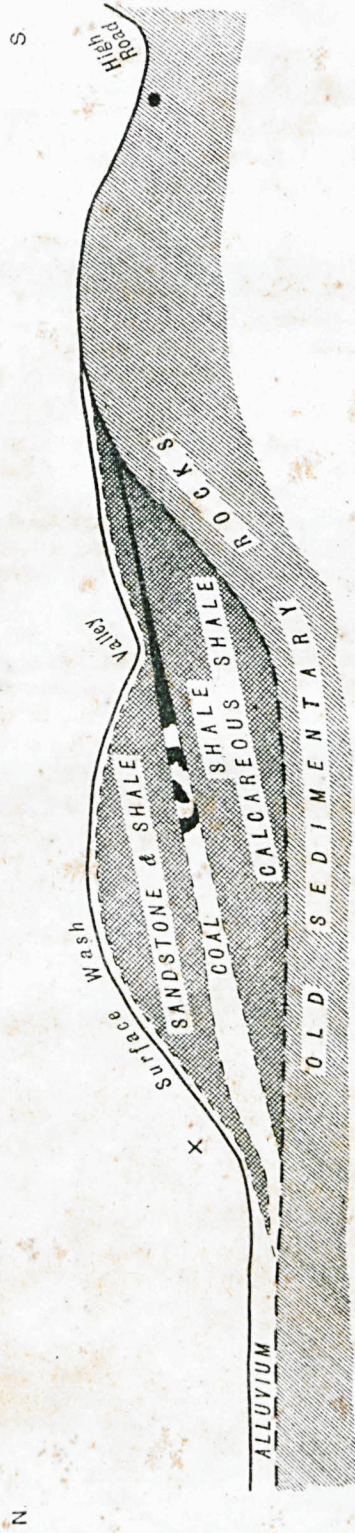
14. However, it must be confessed that such evidence as has been obtained so far in the neighbourhood of the seam is not promising. From some cleared land near pit X one can see hills on the other side of the Sungei Enggor similar to that on which the lessee of lot 1,701 has planted his rubber. The railway has been cut through a spur of one of these hills and the walls of the cutting show clearly that this hill, at any rate, is not composed of the coal-bearing strata, but of the older rocks, which can be easily distinguished from the former by their being traversed by numerous small kaolin veins, probably from the granite, whereas the coal-bearing strata, being younger than the granite, have no kaolin veins.

DETAILS OF EVIDENCE ON AND NEAR LOT 1,701.

15. The sketch-plan, No. 3, is based on a rough survey carried out with a prismatic compass, Abney's level, and measuring tape. It can only be regarded as approximate. The boundaries are taken from a revenue survey plan.

16. Towards the north boundary of the estate is a valley, the line of which is indicated on the sketch-plan. The ground on either side of this valley rises steeply and there is another valley to the N.E. separated by a divide (the draftsman has shown the two valleys as though connected, but this is wrong, there should be no shading by the words "top of divide.")

17. The pits are indicated by letters, A to Z and AA. The dip of the seam was observed in M and in the shaft. It is 10° in the direction of 330° . The strike of the seam is marked on the plan. There is nothing on the surface to show that the main hill of the estate is not all coal-bearing strata (a few boulders of quartz and quartzite may come from the surface wash), and it was, therefore, disappointing to find that a bore of 19 feet put down where the seam should outcrop on the south slope, if such were the case, and a pit, Y, put down where the rocks reached in the bottom of the shaft should outcrop, both revealed the presence of the older rocks. The older rocks were also found in pit N near the coolies' houses, and in pit Z in the far east corner of the estate. A large part of the estate on the south must, therefore, be cut off as unproductive, and the fact that the coal, only two feet thick in the shaft, increases in thickness towards the direction of dip points to Tertiary coal-bearing rocks having been deposited on a steep slope of old rocks with the vegetable detritus starting as a thin layer



(NOT TO SCALE)

towards the top and accumulating in greater and greater quantity down the slope. There is some justification for expecting the seam to increase in thickness the further one goes towards 330° from the top of the hill above the shaft. Under pit X the seam should be thicker than in pit W, but, of course, nothing can be assumed for purposes of estimating the amount of coal. But, whether it is thicker under X or not, there is no question that the northern slopes of the hill on which X is sunk mark the limit of the coal-bearing strata in that direction, because in the low country between that hill and the railway the old rocks have been exposed in numerous pits sunk by tin-miners. A section along the dip, therefore, and as far as the railway must be something like the figure given. (See diagram.)

18. With regard to extension along the strike of the coal-bearing strata, the pits P, Q, R, indicate an extension beyond the estate in swampy ground on the W. S. W. and there is a story of coal having been found there once some years ago. In the opposite direction the pit A is reported to have penetrated 10 feet of coal, which I have no reason to doubt, as the check-pit V was too wet to go on with, and the bore to the north was made with an earth auger that could not go deeper while a lot of coal certainly came out of A. The pit AA has not yet been finished and it is still uncertain what rocks it is in, but even if it proves to be in coal-bearing strata, the old rocks appear not far away from the estate.

COMPUTATION OF AMOUNT OF COAL.

19. As yet there are not sufficient data on which to base an accurate reckoning of the amount of coal available, but, by taking probable limits and an assumed average thickness, it will be possible to judge whether there is likely to be enough coal for Government exploitation.

20. The area of coal-bearing rocks may be roughly computed as 21 acres. Assuming an average of six feet of coal to be workable over this area we have 5,510,400 cubic feet of coal, which, taking 30 cubic feet as equivalent to one ton, equals 183,680 tons of coal. This, reckoned at \$5 a ton, gives a value of \$918,400, but the 183,680 tons is small compared with the estimated 10,744,327 tons of the Rantau Panjang Coal-field, and assuming an average thickness of six feet of workable coal over 21 acres may be assuming too much.

RECOMMENDATIONS.

21. The above figures do not err on the side of pessimism and I do not think that this patch of coal is large enough for exploitation by the Government. Opening it up, to get all the coal, would entail destroying a number of rubber trees, and I suggest that the lessee of 1,701 and the lessees of adjoining blocks be allowed to do what they can with it. (See Revenue Survey plan 2).

22. Coal is now being taken out of the shaft on lot 1,701 and I recommend part being used locally for a boiler-test and part being sent to the Imperial Institute for detailed report. The test and report will be of value as a guide to intending prospectors, who will have a clear idea of the value of the coal before embarking on expenditure.

23. Mr. E. S. Willbourn will carry out further work if it is required. A pit or bore on the north slope of the hill,* at a spot somewhere near that indicated by a cross, seems advisable.

24. I will inform you if any definite information has been obtained from pit AA before I leave Penang.

25. I am indebted to the Warden of Mines, Perak, for assistance in arranging contracts for shaft-sinking and boring.

* See diagram.