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PREOLENNA CANNEL
COAL

by
I. L. Rogers 5/7/34

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Sydney,
July 5th 1934.

Senator The Hon. A.J. McLachlan,
Minister in Control of Development,
CANBERRA. F. C. T.

Preolenna Cannel Coal

Dear Sir,

In accordance with your instructions, I have inspected the Preolenna coal field in Tasmania, and collected as much information as is conveniently available, bearing upon the possibility of exploiting the cannel coal seam for the production of oil. I desire to acknowledge the courtesy and assistance extended to me by Colonel Bell on the occasion of my visit to Burnie and Preolenna.

Occurrence and Quality of Cannel Coal.

The coal deposits of Preolenna are described in detail by Mr. Loftus Hill in a Tasmanian Department of Mines publication, "The Preolenna Coal Field", Geological Survey Bulletin No. 13. Brief references to the field are contained in later publications, viz. Bulletins No. 7, and No. 8 Vol. II. The information in the possession of the Department of Mines regarding the cannel coal seam is summarised in the following statement quoted from the Report of the Tasmanian Shale Oil Investigation Committee, Geological Survey Mineral Resources No. 8, Vol. II, 1933.

The Preolenna shale is a black "kerosene shale" of the nature of a cannel coal, or torbanite, rather than a true oil shale. The shale does not occur in independent seams, but as lenticular bodies in the coal seams.-----Four coal seams have been proved to exist, with the possibility of a fifth one. The seams range in thickness from 9 to 24 inches, the usual thickness being 15 to 24 inches.

In 1922, the probable reserve of coal was calculated as 5,000,000 tons. The shale reserve forms only a small proportion of this and has not been established".

Comments

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Since Mr. Loftus Hill's detailed survey was completed, a considerable amount of further prospecting work has been done by Mr. Barr in another section of the field. The outcrops of the four coal seams have been traced for some distance, adding considerably to the estimated reserves reported in official publications. All four seams are approximately two feet thick, but there are indications that two may be found to converge in a certain restricted area, and then to part again. The thinness of the seams has proved in the past a serious obstacle to the development of the field. The old mine at Preolenna has been shut down for many years. Another mine has been developed recently in the new area, in one of the upper seams, but very little coal is being won. The rich cannel seam is the lowest in the series, and in the recent extension of the field, it has been prospected merely by exposing the outcrop in a few places.

It is claimed that the cannel yields 130 gallons of oil per ton of coal in assay tests, and it is stated that samples have been tested by Mr. J. C. Watson, Chief Chemist of the Victorian Department of Mines, by Mr. E. E. Kurth, Lecturer in Chemistry at Hobart University, and by Messrs. Lyon Bros, Consulting Technologists of Newcastle. The report forwarded from Newcastle indicates clearly that Messrs. Lyon Bros, did not undertake carbonisation tests, and that they merely expected to recover at least one hundred gallons of oil per ton. Mr. Kurth states that he has not yet examined the samples sent to him. Mr. Watson also advises that he has not tested any Preolenna cannel coal, but that in 1925 he did examine a sample of oil said to have been derived from this source.

In all the information made available by Mr. Barr, there is no authentic statement of possible oil yields. The proximate analysis made by the Tasmanian Department of Mines indicate, however, that the Preolenna cannel seam is very rich. The volatile content of the richest sample reported is quite consistent indeed with an assay yield of 130 gallons of tar per ton. Other proximate analyses suggest considerably reduced yields, however, and the average recovery

from the cannel treated by a commercial plant over a number of years would probably be much less than one hundred gallons per ton.

It would appear that such little information as is available applies to the seam as exposed in the ninth mile tunnel and elsewhere in the old field, rather than to the new extension. In view of Mr. Loftus Hill's statement that the rich cannel occurs merely in the form of local variations in seams which consist essentially of coal or poorer cannel, some caution must be observed in quoting results from samples taken from a limited number of places. The thinness of the seam appears to preclude the exploitation of the cannel in the older section of the field. Before the establishment of a distillation plant in the new area can be entertained, it is essential that the quantity and quality of the cannel available should be closely and accurately determined.

The best method of acquiring this information would consist in driving a number of tunnels well into the seam at intervals along the outcrop. The amount of cannel blocked out by these tunnels should be commensurate with the requirements of a small commercial plant, say 250,000 tons. The expense of opening up the seam on this scale might be reduced by sinking a number of bores between adjacent tunnels, but in any case the expenditure is likely to be heavy. Before undertaking any such programme of development, the economics of prospective operations should be carefully studied.

Distillation of Preolenna Cannel Coal.

From a cannel yielding 130 gallons of ter per ton in an assay test, a recovery of not more than 100 gallons could be expected in a commercial retort. As this is probably the yield from the richest grade of cannel in a seam of widely varying values, it is proposed in the following calculations to assume an average recovery of eighty gallons per ton. It must be clearly understood, however, that this assumption is not supported by authentic evidence. It is not even an estimate. It is merely a more or less likely hypothesis assumed for the purpose of making preliminary calculations of income and expenditure.

The proximate analysis of Preolenna cannel shows that this

material is a rich cannel and not an oil shale. Mr. Watson's report indicated that the tar is highly aromatic, and that the heavy end contains pitch. In these circumstances, the product should properly be regarded as a tar and not as an oil. The possibility of refining by cracking does not arise, partly because the tar would be a poor cracking stock and partly because the scale of operations is limited by the market to less than that of an economical cracking unit. It is assumed therefore, that the tar would be refined by distillation and chemical treatment only.

The products which might be prepared for the market from Preolenna cannel tar are motor spirit, power kerosene and fuel oil. The sample of crude tar supplied to Mr. Watson for analysis had a sulphur content of 1.24%. Some difficulty may be anticipated in refining the petrol from this tar to a satisfactory sulphur standard, but for the moment this uncertainty may be overlooked. It should be borne in mind, however, that if a decision be taken to proceed with the establishment of a distillation plant, some preliminary work is required on the quality of the petrol.

The fuel oil would need to be a distillate and not a residuum, for the inclusion of pitch would make the oil too heavy, and would prevent it from mixing with other fuel oils put into the same storage tanks. The pitch would have little or no value as a bitumen for road making, and it is assumed here that it would be used for firing boilers on the works.

The ash present in the cannel as charged to the retorts would become so concentrated in the coke residue that it may be doubted whether this material would have any commercial value. It is proposed however, to credit the coke with a value of 5/- per ton. at the works, on the assumption that a portion of it may be prepared for the market by floating or by some other means.

The products made from one ton of cannel would then be as follows.

Coke Residue.	8 ^c dwts.	(Selected material sold; remainder used for heating retorts etc.)
Gas.		(All used for heating retorts etc.)
Crude Tar	80 gallons.	
Refined Petrol	10 "	
Refined Power Kerosene	8 "	
Fuel Oil	32 "	
Pitch	25 "	(All used for boiler firing etc.)
Losses	5 "	

The present market for power and lighting kerosene in Tasmania is only 500,000 gallons per annum. The kerosene which might be prepared from cannel coal would be too unsaturated and aromatic to be used for illuminating purposes. Great difficulty would be experienced in selling more than 100,000 gallons of kerosene at market prices. Nevertheless, in order to make the project appear as favourable as possible, it is assumed that 200,000 gallons could be marketed each year without accepting reduced prices. On this basis it would be possible to carbonise only 25,000 tons of cannel per annum or 70 tons per day.

The quantity of motor spirit produced by operating on this scale would be small compared with Tasmanian requirements, but the amount of fuel oil potentially available would be ten times larger than present importations. If a contract could be secured for bunkering the new oil burning steamer which is soon to be placed in commission on the Launceston-Melbourne service, it would be possible to sell the 3,300 tons of fuel oil recoverable from 25,000 tons of cannel per annum. Otherwise there is no prospect of finding any market for this product at all.

It is assumed in the following preliminary estimates that the quality of the motor spirit is satisfactory, that a market can be secured for 50% of Tasmania's requirements of power kerosene, and that a contract would be obtained for supplying fuel oil to Tasmanian Steamers Ltd. In order to avoid a detailed investigation of marketing costs, involving a considerable amount of work which

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certainly is not justified at present, the returns from the sale of products are estimated from current wholesale prices and approximate transport costs. The values of the products ex works are assumed to be-

Motor Spirit.	1/- per gallon.
Power kerosent.	10½d. per gallon.
Fuel oil.	£2/10/- per ton.
Coke	5/- per ton.

The mining of the cannel presents some prospective difficulties. The seam is only two feet thick and all brushing must be done in sandstone. Cannel is harder and tougher than bituminous coal, and in this instance holing does not appear easy. The seam dips fairly steeply and water trouble may develop below the creek level. Altogether it would seem likely that mining will be expensive. The total cost of delivering the cannel crushed into bins can hardly be less than 25/- per ton, and may easily exceed 30/-. For the purpose of presenting the project in its most favourable light, the cannel is assumed in the ensuing calculations to be won for 25/-. It cannot be too strongly emphasised that this important item of cost is very uncertain, and that if the proposition be entertained, the opinion of experienced mine managers should be sought in confirmation.

Other operating costs are assumed to be as follows-

Carbonisation, exhausting, condensing, scrubbing.	6/- per ton.
Distillation of crude tar, refining of petrol and power kerosene.	1.15 pence per gallon of crude tar.

The capital required for establishing the industry on this scale is estimated to be roughly as follows-

Mine equipment and development, crushing, transport and storage facilities.	£25,000
Retorts, refinery, buildings, boilers and power plant, supervision of construction	£35,000
Storage and distribution facilities.	<u>£10,000</u>
Total Capital cost.	<u>£70,000</u>

It will be noted that no provision has been made for housing employees. Any company formed to finance this project would need to construct dwellings for all men working in the mine and on the plant. It may be assumed in these preliminary estimated, however, that the rent charged for the houses would cover all interest, maintenance, insurance, and depreciation charges.

The working capital required would be of the order of £5,000.

A tentative profit and loss account may now be presented as follows:-

Expenditure.	£	Revenue.	£.
Mining, crushing and transport of 25,000 tons of shale per annum.	31,250	Motor Spirit 250,000 galls. @ 1/-	12,500
Carbonisation, exhausting, condensing, scrubbing.	7,500	Power kerosene. 200,000 galls. @ 10½d.	8,750
Distillation and refining.	9,580	Fuel Oil. 3,300 tons @ £2/10/-	8,250
Interest on working capital @ 6%.	300	Coke. 10,000 tons @ 5/-	2,500
Divident on subscribed capital @ 6%.	4,200		
Depreciation of assets 20 years. 3.5%.	2,450		
Management, insurance, and office expenses.	2,000		
Excise. 5½ pence per gallon of petrol.	5,730		
State Dividend Tax.	310	Deficiency.	31,320
Total Expenditure.	£63,320	Total.	£63,320

It has been assumed, for the purpose of preparing this account, that the deficiency would be met in some way by the Commonwealth Government, and that Commonwealth taxation would not be imposed on the dividend distributed.

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It is not quite clear whether the motor spirit would be classed as a coal benzol which is subject to $1\frac{1}{2}$ pence excise, or as a shale spirit on which a charge of $5\frac{1}{2}$ pence is levied. The spirit of the regulations, however, is that the lower rate is charged only against by-product petrol, and in accordance with this view the full excise charge has been used in the estimates.

The industry, if established on this scale, would find employment for about a hundred men.

Summary of Conclusions and Recommendations.

Only meagre information is available at present regarding the quality and extent of the cannel coal seam at Preolenna. For the purpose of this report, it has been necessary to make a number of assumptions. On the understanding that the main object of the report is to indicate whether further investigation can be recommended, these assumptions have purposely been made to favour the project in all instances where any doubt exists. Subject to verification of many statements and figures adopted, it would appear that the maximum scale of operations which can be entertained is seventy tons of cannel per day, and that an annual deficiency of over £30,000 must be anticipated. If it be considered that assistance to this extent would be justified by the employment of a hundred men approximately, and by the local production of almost insignificant quantities of motor spirit, kerosene and fuel oil, then further investigations should be made as follows-

- (1) Verification of all capital and working costs quoted in this preliminary statement.
- (2) Verification of the assumption made regarding the quality of the rich cannel available, by driving tunnels and drilling holes to sample and prove the existence of approximately a quarter of a million tons.
- (3) Treatment of a bulk average sample of perhaps fifty tons, for the determination of commercial *yields*
- (4) Examination of the motor spirit with a view to reducing the sulphur content to acceptable limits.
- (5) Investigation of the possibility of securing a market for power kerosene and fuel oil on the scale of the contemplated output.

Sgd. L. I. Rogers.