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PHOSPHATE DEPOSITS AT MANSFIELD.

This report is written as a result of observations made at Mansfield during an examination of the phosphate deposits in company with members of the Joint Parliamentary Committee on Rural Industries on the 20th March. These deposits have been well described by A. H. Hewitt in Bulletin No. 45 of the Geological Survey of Victoria. This Bulletin was issued in 1923, but production was still recorded from Mansfield up till 1926 so that the information in the Bulletin is not fully up to date. Mr. Thompson of the British Phosphate Commission mentioned that he had access to the records of the work done since Hewitt's report was completed and Mr. Thompson is making that information available. Until then these notes must be regarded as of a preliminary character only.

PHOSPHATE HILL. The deposits on Phosphate Hill, three miles west-north-west of Mansfield occur as beds usually averaging 3 or 4 feet in width, contained in a series of Upper Cambrian cherts and shales. The phosphate content is derived from the original organic material deposited with the rock. The Cambrian strata are overlain unconformably by Upper Ordovician shales and their outcrop is here limited to an area about 1200 feet long with a maximum width of 260 feet. The beds are folded, in places intricately, and often faulted, but dip generally either to the south or to the east at a steep to moderate angle (refer to Plate No. 2, Bulletin No. 45, Geological Survey of Victoria). The phosphatic material, which comprises both calcium and aluminium phosphates, appears to be somewhat lenticular in its occurrence. Beds exposed on the surface have been worked for varying depths up to 70 feet and a total of 15,781 tons has been taken out. It has not been possible so far to obtain the average grade of the material mined although this information should still be available from the records of the former Heathcote Chemical Company. Hewitt refers to rock containing 21% of P_2O_5 as high-grade, and it appears that the average would be less than this. The content of iron oxide and alumina also varies considerably in a number of assays, from 2.6% up to 26 %, but in most cases is between 5% and 8%.

Averaging the area of surface outcrop of phosphate, the amount which might be expected per foot of depth, assuming a conversion factor of 16 cubic foot of phosphate rock per ton, is roughly 400 tons. This figure is confirmed also by calculating back from the ore extracted and the dimensions of the excavations supplied by Hewitt. This means that if the surface dimensions of the phosphates should continue to 150 foot depth, some 40,000 tons of phosphate rock could be available allowing for what has been already extracted. In the absence of data with regard to the behaviour of the beds in depth it is difficult to say to what extent superficial enrichment may have affected the phosphate values near the surface. The fact that the bodies are lenticular on the surface, as would be expected from beds which owe their phosphate content to the accumulation during deposition of sufficient organic remains to supply it, would indicate that they would also be lenticular in the vertical

section, but there is no reason why other lenses should not exist in depth, unless a synclinal axis exists to the south and east of Phosphate Hill and the phosphate-bearing beds are brought up to the surface again or rather, up to the bottom of the overlying formations. It is unfortunate that the Upper Ordovician beds mask the structure of the Cambrian formation and also cover any possible extension of the phosphate beds. The most effective way of obtaining information about the possibility of further phosphate in depth would probably be a series of inclined drill holes from just south of the exposures, to cut the phosphate beds between 100 and 200 feet in depth. Such work would not of course be undertaken until it was proved that the Mansfield phosphate has a definite fertiliser value.

HOWE'S CREEK DEPOSITS. A series of workings, described by Hewitt, have been put in on Mr. Griffiths' property about 6 miles south-south-west of Mansfield. The strata here are apparently of Silurian age and certain beds contain a percentage of phosphate. An adit was put in from the hillside and a drive south-easterly and north-westerly from the adit followed apparently the highest grade beds for a total distance of about 240 feet. The best material is found along the south-easterly drive, associated with a series of faults or shears running nearly parallel to the bedding, which dips fairly steeply to the south-west. Along the faults, particularly the underneath side, the shales have been brecciated, and this material contains the highest values, averaging perhaps 10% P_2O_5 with an iron plus alumina content usually between 5% and 10%. The better values in this brecciated material are due to phosphate being dissolved from the low-grade beds at higher levels and deposited in the interstices of the breccia. The faulting is not continuous but rather comprises a series of small breaks, and if the phosphate of workable grade is confined to their immediate vicinity its occurrence is likely to be sporadic and the total quantity not great. A trial parcel is being shipped to Melbourne for tests. It is recommended that an early opportunity should be taken to sample the underground workings on these deposits to determine more accurately the phosphate content of the beds away from the vicinity of the brecciated areas. Hewitt quotes two analyses across the face of the 30 foot Level in the shaft which is connected to the underground workings. These analyses which probably represent non-brecciated material are as follows:

	P_2O_5	CaO	Al_2O_3	Fe_2O_3
Average across S.W. face, 30' Level shaft	7.90	5.20	2.68	5.44
Average across N.W. face, 30' Level shaft	5.08	7.20	2.12	3.28

If these values are confirmed by sampling in the main drives, it means that the possibilities of this type of deposit are limited to small tonnages in the brecciated areas.

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