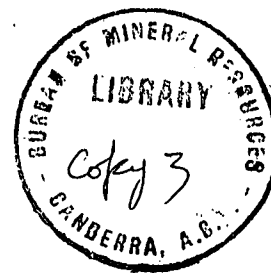


COMMONWEALTH OF AUSTRALIA



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DEPARTMENT OF NATIONAL DEVELOPMENT  
BUREAU OF MINERAL RESOURCES  
GEOLOGY AND GEOPHYSICS

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RECORDS:

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1943/26

PHOSPHATE DEPOSITS-ASHFORD CAVES.

by

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## PHOSPHATE DEPOSITS - ASHFORD CAVES.

(Report No. 1943/26).

### (I) INTRODUCTION.

The Ashford Caves are situated on M.L. 1, Parish of MacIntyre, County of Arrawatta, approximately 12 miles north-westerly from Ashford and 47 miles from rail at Inverell.

Claims have been made that there are large reserves of both guano and phosphate rock in these caves. It has been claimed in the Press that 1,200,000 tons of guano are available.

### (II) GUANO DEPOSITS.

There are two main caves - the eastern and the western - and the guano (formed by the impregnation of cave earth by bat droppings) occurs in both. The first attempt to mine and sell the guano was made during the 1914-18 war and other attempts have been made at intervals up till the present. The total output recorded by the New South Wales Department of Mines is approximately 1,000 tons.

The guano deposits in the caves were reported on by Mr. F. W. Booker, M.Sc., Geological Surveyor, New South Wales Department of Mines, when he and Mr. F.E. Hanlon, B.Sc., Geological Assistant of the same Department, surveyed them. Shafts were sunk to determine the depth of the deposits at various points and samples taken from these shafts and analysed. The results of this work showed that the average thickness was 4.5 feet and the  $P_2O_5$  content ranged from 2% to nearly 21%. This large variation would render it difficult to mine a uniform grade of material even if the tonnage available warranted it. The possible reserves were estimated at approximately 4,500 tons in the eastern cave and 1,500 tons from the western cave, making a total of 6,000 tons with an average  $P_2O_5$  content of approximately 8%. Of the higher grade material in the above there appeared to be approximately 200 tons averaging 20%  $P_2O_5$ , 650 tons averaging 17%  $P_2O_5$ , and 250 tons averaging 10%  $P_2O_5$ . The remaining 4,900 tons would average 6%. The opinion was expressed that the tonnage of material available from these caves was negligible in comparison with Australian requirements.

The caves were visited on 17.6.43 by the writers in company with the Commonwealth Parliamentary Joint Committee on Rural Industries.

There have been no developments since the examination by Messrs. Booker, and Hanlon, and at the most only a few tons of material have been removed from the guano deposit. It was, therefore, not necessary to re-survey and re-sample the deposit. We have perused and considered Mr. Booker's report and plans and agree with the conclusions reached by him.

Making use of all the information available our views may be summarised as follows:

- (1) The total amount of guano is approximately 6,000 tons with an average value of 8%.
- (2) The above 6,000 tons contain the following amounts of higher grade material:

250 tons with 10% $P_2O_5$
650 tons with 17%     "
200 tons with 20%     "

- (3) As Australia's requirements of phosphate rock for the year 1938-39 were 731,843 tons, with a phosphoric acid content of about 40%, it is obvious that even if the guano were acceptable to superphosphate manufacturers as regards grade, the amount

available would form only a minute fraction of these requirements.

- (4) The possibility of using the material locally by market gardeners is worthy of consideration and, perhaps, investigation. In this respect it is noted that local experience in the use of the guano direct seems to be that the phosphate content is not immediately available to plant life as with superphosphate. Some delayed benefit is reported, but it is not definitely known that this is due to the phosphate content of the guano. In order to determine whether this material could be used as a phosphatic manure, it would be necessary that -

- (a) Determination be made of the proportion of phosphoric acid which is water soluble and readily available to plant life.
- (b) If the above be low, the determination be made of the period necessary after application to the soil before the phosphoric acid content is available.
- (c) Field tests be made to determine whether the benefits reported have been due to the phosphoric acid content of the guano.

If it is desired that these tests be undertaken, it is suggested that they might perhaps be carried out by the New South Wales Department of Agriculture or the Council of Scientific and Industrial Research. It should be pointed out that the tonnage available is so small that only limited and inexpensive tests are warranted.

### (III) PHOSPHATE ROCK DEPOSITS.

Since Mr. Booker's report it has been stated that, in addition to the guano, phosphate rock occurred in large quantities at the Caves. The present investigation was concerned mainly with steps to determine the location of this material and the estimation of its quantity and grade. Enquiries were made of Mr. Merry, the present lease-holder and from Mr. Black, the President of the Ashford Shire Council. Mr. Merry stated that he knew of a deposit of "phosphoric" rock. He used this term in the sense normally used for phosphate rock and particularly for deposits which he pointed out to us. The phosphate rock referred to by Mr. Black was the same as that indicated by Mr. Merry. No other information regarding phosphate rock could be obtained.

The main phosphate rock deposit indicated occurred in a small cave situated on the hill above the two main caves and its entrance was about 200 feet west of the entrance to the eastern cave. From its entrance the cave extended about 25 feet to the north, was about 25 feet wide and ranged in height up to 10 feet. The floor of the cave had a general fall to the east. The deposit consisted of a partially cemented mixture of limestone fragments (up to 6 inches largest dimension), decomposed bone fragments and finer earthy material. Around the mouth of the cave the material was more strongly cemented. It almost completely filled the western portion of the cave, attaining a thickness of 6 to 8 feet. In the lower or eastern portion of the cave the thickness was indeterminate but seemed to be only about 1 to 2 feet thick. It was roughly stratified and part of the earthy material and limestone fragments may have been washed in during periods of heavy rainfall. The bones would have been derived from the skeletons of animals which had died in the cave. Visible examination of the deposit indicated that the bone content would not exceed 5% to 10%. The finer material may contain smaller bone fragments and possibly bat droppings. In general, it is anticipated that the phosphate content would not be high. A sample was taken across 6 feet of the thickness of the deposit and the result will be submitted when the analysis is

received. This sample contained a smaller proportion of limestone fragments than that contained in the bulk of the deposit, so that the phosphoric acid content would be greater than the average. Based on an area 25 feet by 25 feet an average thickness of 6 feet, and allowing 20 cubic feet per ton, the amount available in the cave would be about 200 tons.

A small occurrence was pointed out in the eastern cave. It appeared to be a filling of a vertical solution cavity about 2 to 3 feet wide. Its extent could not be fully determined, but the quantity would be very small, considerably less than in the cave described above.

On the hill above the two main caves there is a general line of material similar to that at the mouth of the cave containing the phosphate rock. Most of the material consisted of loose boulders and the remainder of small horizontal slabs attached to the limestone. The occurrence suggested that this material had previously formed a deposit in a cave or caves subsequently destroyed by erosion. Little material remains in situ and the quantity in this deposit would be negligible.

About half a mile back on the road to Ashford, another deposit of material similar to that described above was inspected. In this case the material appeared to occupy a shallow solution cavity. The width was about 3 to 4 feet and it could be traced for about 50 feet. Very few pieces of bone were visible in it. The quantity of material would be extremely small and the grade probably very low. The deposit could not be considered of any importance.

Our conclusions regarding the phosphate rock are:

- (1) The total quantity would not amount to more than a few hundred tons.
- (2) The phosphoric acid content of the material is probably low. The actual grade of the most extensive deposit will be determined by the sample awaiting analysis.
- (3) It is highly improbable that development work would appreciably increase the estimate of the quantity available in the deposits described above.
- (4) Further prospecting work may disclose other similar small deposits. There is no reason, however, to expect that such deposits would differ either in size or grade from the known ones.
- (5) Developmental or prospecting work is not recommended

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21st June, 1943.