

COMMONWEALTH OF AUSTRALIA

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PHOSPHATE DEPOSITS KAPUNDA-ANGASTON DISTRICTS, SOUTH AUSTRALIA

by

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DEPARTMENT OF SUPPLY AND SHIPPING

Mineral Resources Survey Branch

Report No. 1943/20.

Plan Nos. 843, 844 and 845.

PHOSPHATE DEPOSITS

KAPUNDA-ANGASTON DISTRICTS, SOUTH AUSTRALIA.

The most important phosphate deposits in South Australia are situated in the Kapunda-Angaston districts and of those the principal deposits which have been worked are:

1. St. Kitts. 12 miles easterly from Kapunda.
2. St. Johns. 4½ miles south-east from Kapunda.
3. Tom's. 5 miles east-south-east from Kapunda.
4. Moculta or Klemms. 3 miles north-east of Angaston.

Deposits Nos. 2, 3 and 4 were examined in company with Mr. S.B. Dickinson, Deputy Government Geologist of South Australia on the 30th March. The only important deposit not visited was No. 1 on which no recent work has been done and the title of which is subject to litigation.

All the deposits dealt with in this Report are described in Bulletin No. 7 of the Geological Survey of South Australia by Dr. R. Lockhart Jack to which publication reference should be made for details. They have also been resurveyed and sampled recently by Mr. S. B. Dickinson.

The following notes are written to set out as briefly as possible, the salient features of the deposits and to indicate the prospecting which it is considered is immediately necessary.

ST. JOHNS, SECTION 1551, HUNDRED OF BELVIDERE (Fig. 1).

Phosphate rock occurs at intervals over a length of 2,700 feet and quarries have been opened at two points about 500 feet apart. These two quarries have been fairly closely sampled recently by Mr. Dickinson and the results indicate that there is a good proportion of the exposures which could be worked to give a product averaging about 40% tricalcic phosphate. The deposit is stratified and the structure can be decyphered. Some preliminary geological mapping done by Mr. Dickinson broadly defines the structure and clearly indicates that it is useless to attempt development prior to careful prospecting, which, because of the complexities of the structure will require geological guidance. It appears that the section of the deposit which has been worked is part of a syncline and anticline whose axes are approximately parallel to the length of the main quarry. There is a suggestion also that the folds may approximately close beyond the ends of the open cut.

The British Phosphate Commission has cleaned up the larger quarry and has done the following prospecting:

1. Put down two prospecting shafts in the floor of the western half of the quarry.
2. Commenced two adits, one at each end of the southern wall of the quarry.

A further shaft is to be sunk near the mouth of the eastern prospecting adit.

The fact that the deposit is stratified means that it can be satisfactorily prospected by boring, but the presence of high dips means that it will be essential to be able to take cores from time to time. It will readily be seen that misleading results will be obtained if a bore happens to penetrate on unusually rich or poor

zone with a high dip. In that event also the apparent thickness will be misleading.

100 feet grid has been surveyed by an officer of the State Lands Department who has also surveyed and taken levels of all present workings. After discussion with Mr. Dickinson it is considered that provision should be made in the first instance for drilling twenty holes on this grid many of which may need to be 100 feet deep. The State Mines Department has appointed an experienced Geologist, Mr. Broadhurst, who will be available full time, to map the deposits in detail and to supervise drilling. As the drilling programme proceeds he should be given authority to vary any drilling programme which may be tentatively decided upon.

The State Mines Department will soon have two percussion drills operating on the deposit, and from this it will be possible to learn whether this type of drill is satisfactory. Cores can be taken with these rigs.

The boring programme outlined above, together with the work done and to be done by the British Phosphate Commission, should prove the deposit adequately. Pending completion of this prospecting it would be unwise to continue development, since the best way of working the deposit and of disposing of overburden cannot be decided at this stage.

TOM'S QUARRY AND ADJOINING AREA, SECTIONS 84 AND 295, HUNDRED OF BELVIDERE (Fig. 2).

Tom's Quarry in Section 295 has been worked for a considerable time by the Broken Hill Pty. Co. for the production of phosphate rock of about 40% grade to be used in the manufacture of high-phosphorus pig. Control of grade is maintained by the foreman who makes rough assays in the field.

The deposit worked in this quarry extends out of the area held under lease by the Broken Hill Pty. Co. into Section 84, Hundred of Belvidere. A considerable amount of shallow prospecting has been done on this section by the British Phosphate Commission and drilling by the State Mines Department is in progress, one bore having been recently completed at a depth of 100 feet.

This bore revealed the following section:

0 to 46'	- Low grade.
46 to 85'	- 43.9 to 59.6% Tricalcic phosphate.
85 to 100'	- Low grade.

The deposit appears to be developed for short distances on the limbs of a sharp synclinal fold pitching to the south and it is thought that as the Broken Hill Pty. Co.'s workings are extended, the ore-body will be found to swing around from its present course, which is north-east to south-east. If this is so, it will be seen by reference to the accompanying plan that one of the best means of proving the deposit would be to extend the old adit (which is accessible and which is shown on the plan herewith) for a distance of approximately 100 feet to the north-east.

MOGULTA OR KLEIMS, SECTIONS 102 AND 105, HUNDRED OF MOORCOROO (Fig. 3).

The position here is almost as it was described by Dr. Jack in 1919. The British Phosphate Commission is in course of continuing the narrow open cut which is shown approximately at the centre of Fig. 3 to meet the south-west corner of the main open cut.

This deposit is rather different in type from both of the others in that it consists chiefly of nodules which vary considerably in size, and are occasionally up to the size of a football, of concretionary phosphatic rock. It has been demonstrated that the nodules are of considerably higher grade than the matrix. Owing to the nodular

nature of the deposit, it cannot be satisfactorily tested by boring and it will be necessary to do this by sinking shafts. Also, on the evidence so far available, it is impossible to form an idea of the shape of the ore-body.

Tests carried out by the British Phosphate Commission indicate that quite high grade phosphate rock can be obtained from this deposit and the possible area of phosphate-bearing country is sufficiently large to warrant thorough testing.

At the time of my visit, an officer of the South Australian Lands Department was engaged on a survey of the area including the pegging of 100 foot grid. It is considered that an area of approximately 700 by 300 feet should be covered by prospecting shafts and in addition that a shaft should be sunk in the bottom of the main open cut. It is thought that approximately 20 shafts will be required. Probably most of the shafts will need to be from 30 to 50 feet deep, but the depth factor is difficult to estimate.

#### CONCLUSIONS AND RECOMMENDATIONS.

As a result of the prospecting work of the British Phosphate Commission and of the geological survey by Mr. Dickinson, it would seem that a rather more hopeful view can be taken of the possibility of producing worthwhile quantities of phosphate rock from South Australia than was previously possible. It is not practicable at the present time to express these possibilities in actual figures, but it is clear that the prospects are sufficiently encouraging to warrant a thorough prospecting campaign.

As large parcels of phosphate rock from the St. Johns deposit have been sent to each of the three superphosphate manufacturers in South Australia, it is considered that production should be suspended pending further prospecting.

While this prospecting work is being done, consideration could be given to possible methods of utilizing the grade of ore which is likely to be obtained. Consideration might also be given to methods of treatment and beneficiation, though it is hoped that an outlet can be found for the bulk of the crude ore as mined. Summarising recommendations made above it is considered:

1. The boring campaign proposed for the St. Johns deposit should proceed.
2. That the adit referred to near Tom's deposit should be extended to the hanging wall of the phosphate deposit.
3. That approximately 20 prospecting shafts should be put down on the surveyed grid at Klems deposit.

CANBERRA, A.C.T.  
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Director,  
Mineral Resources Survey

St John's Phosphate Mine - Section 1551  
Hundred of Belvidere, S A

FIG. 1

120 0 240 480 ft



Line of darker soil  
indicating phosphate

1451

1533

Phosphate  
Limonite outcrop

Limestone

Limestone

MAIN ROAD

Schist ROAD

Quartz & quartzite outcrop

Schist & quartzitic  
Schist stones

Pit  
Phosphate

Tertiary Gravel

Phosphate rock

Phosphate of  
alumina

Dam

Private Road

Gully

Main Roadway

Principal Workings

10' shaft  
clay pit  
Adits  
in progress

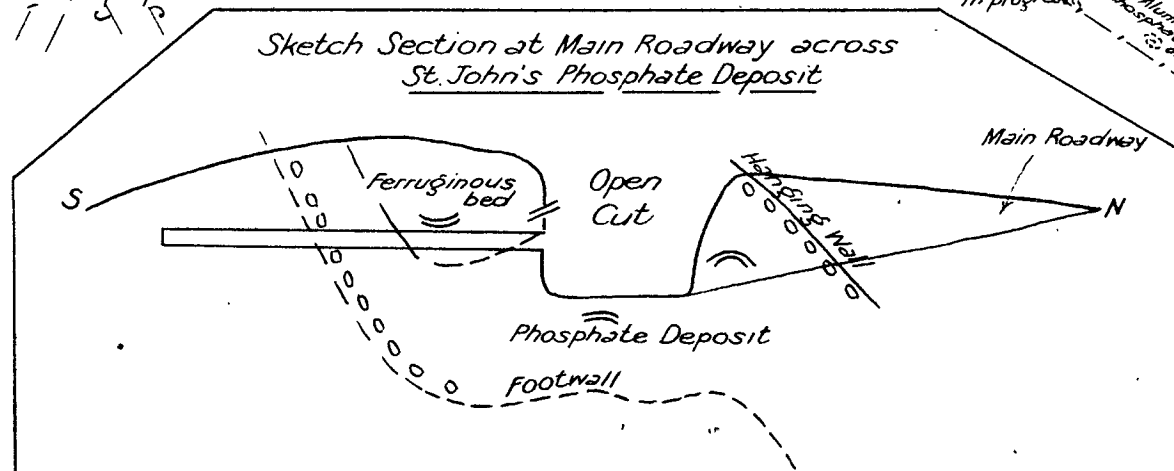
Aluminum  
phosphate  
outcrops

40' Crystalline  
Limestone  
40' Limestone  
40' Limestone  
Soil

Southern Workings

Stones of phosphate  
of alumina in this area

Sketch Section at Main Roadway across  
St. John's Phosphate Deposit



After R L Jack & S. B Dickinson

Fig 2

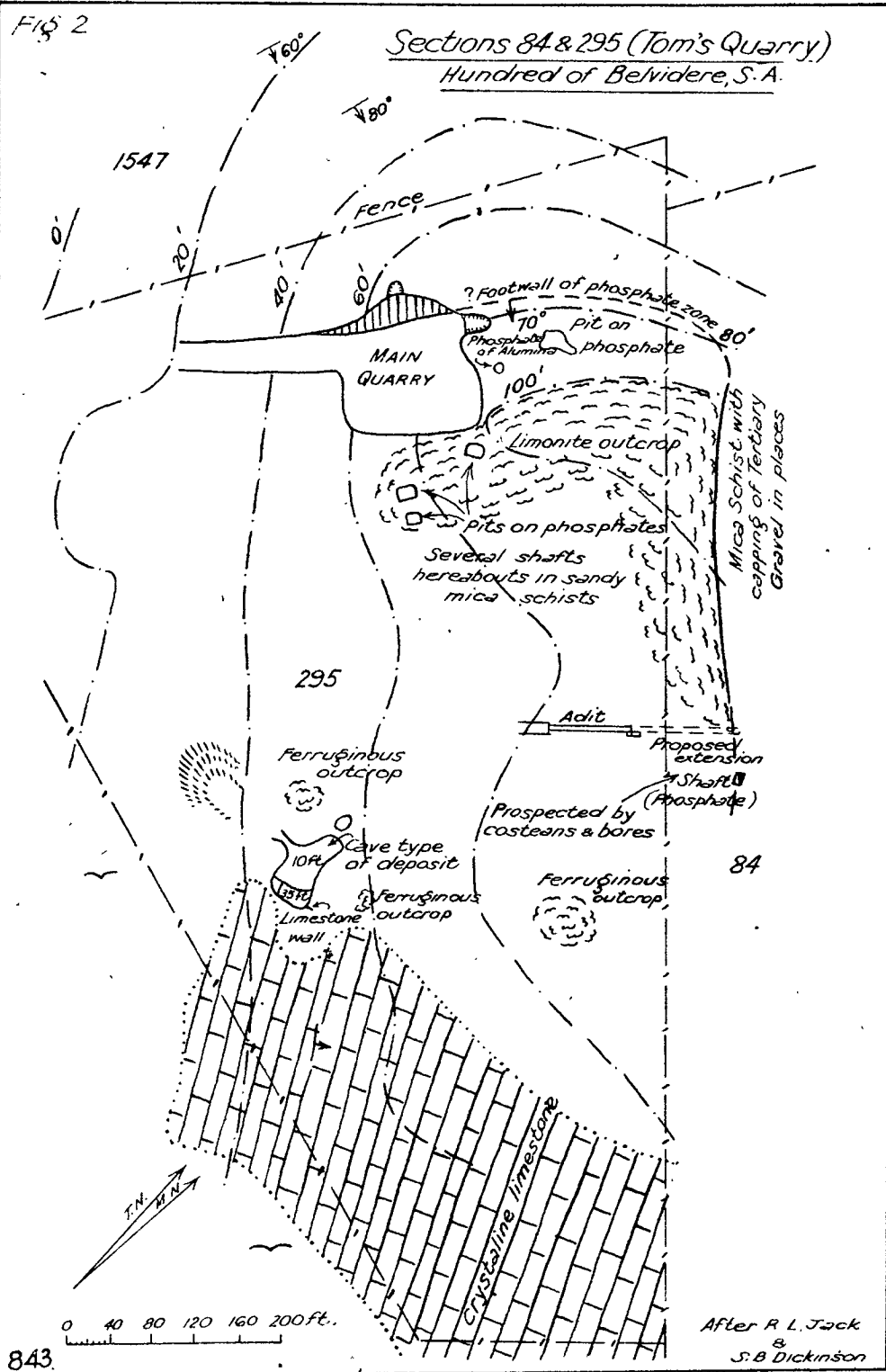


Fig 3

