Copy of Report by Richard Shephard.
1929

MEMO RE DEPOSIT OF POTASSIUM NITRATE CENTRAL AUSTRALIA

Early in 1927 beneath a flat capping manganiferous inonstone, a deposit of ochre coloured sandstone containing a considerable percentage of nitrate of potash was accidentally discovered by a black boy about 120 miles W. from Alice Springs. He had entered a cave in the sandstone which had been formed by weathering under the edge of the ironstone and lighting a fire on the floor was frightened out by a burst of violent flame due to the ignition of crystals which had effloresced out of the exposed walls and floor. He mentioned his adventure to a white man some months later with the result that Messrs Wolfe and J. O'Neil pegged our and registered a mineral Lease No. 516 with the Warden at Alice Springs on 23rd September, 1927.

During the four months last summer that the writer spent in Central Australia inspection and sampling mining properties for a group of Melbourne capitalists he was told of this show by Mr. E. Alchurch, the local Post and Telegraph master. Being much interested he got all available particulars and went out and inspected the claim on 9th February, 1929.

As the site of the claim is rather far out in poor country about which little is known and very few white people have actually seen it the following particulars should be interesting.

The Mineral Lease as pegged comprises 40 acres taking in the above outcrop and another similar of large size approximately as shown on the sketch plan herewith There is another still larger and of higher elevation above the plain, about ½ a mile away, which has not been taken up.

The lease is described in the Warden's office as being nine (9) miles S.W. from Mt. Sonder, but it has not yet been accurately located or surveyed and appears to the writer to be more like five (5) miles W.S.W from that mountain and six (6) miles due S. from Mt. Razorback and is eighteen (18) miles by track W. from the gorge which the Fink River has forced through the main Macdonnell Range on its way S. towards Lake Eyre and roughly some ~~50~~ 30 miles N.W. from the Hermannsburg mission station.

The sketch plan shows the size and positions of the two flattened iron-stone outcrops which stand up about 35 feet and 50 feet above the surrounding plain, The Northern and smaller cap has a superficial area of about 50.000 sq. feet while the larger one to the South would be about half as large again and is flanked on the southern side by limestone containing fossils of obviously marine origin.

At the S.E. corner of the smaller outcrop is a cave about 20 x 12 feet area x5 feet deep, immediately below the ironstone cap which at this point is 4 feet or 5 feet thick.

The walls and floor of this cave are an ochre-coloured soft sandy rock containing small translucent crystals with larger ones which have effloresced on the outside.

Tests have been made of samples taken by the writer from this cave by W. Dods of 277 Franklin Street, Melbourne, giving the following results.

1. Decripitated Rock from floor of cave — 4% Solubles
2. Partly leached Rock from sides of cave — 7.34% Solubles
3. Thin vein manganese ironstone in wall of cave. — 11.02% Solubles
4. Unaltered rock from wall of cave 6" in from surface and away from atmosphere — 28.13% Solubles
5. Specimens of larger crystals from walls and floor of cave which have effloresced — 9.55% Solubles

This last sample would be typical of the crude salts which would be shipped from the claim and was found to be all $KN0_3$ with the exception of about 3% which is sol. chlorides (KC1, NaC1 and $CaC1_2$ and sol. sulphates.

There are holes through the ironstone roof farther along to the N. which are in communication with the cave and show that the underlying nitrates extend in that direction.

As no prospecting whatever has yet been done, the area of these underlying nitrates and the vertical depth of their deposit has yet to be determined.

But putting the larger southern outcrop of the question for the time being the northern outcrop has a superficial area of about 50,000 sq. feet assuming that the nitrate bed beneath it is half that area by 5 feet thick (which is the depth of the cave), there would be 125,000 C. feet of nitrogenous sandstone weighing about 8,000 to 9,000 tons from which @20% leacheable extraction some 1,600 tons of crude salt could be recovered. Of course, if the sandstone bed is more than 5 feet thick or larger in area or the larger southern outcrop is standing over a similar bed the figures would be correspondingly greater.

Before passing on to the mode and cost of treatment, plant and capital outlay involved, a few facts bearing on the position of the deposit, its origin and preservation, will be in order.

The flat country surrounding the various ranges called the MacDonnell Range is about 2,000 feet above sea level.

The hills are scattered bout in standing up through the plains are mostly quartz bearing schists with occasional ridges of marine limestone in varying stages of denudation from a few feet up to 500 feet high while the main ranges themselves striking roughly E. and W. are hard sedimentary quartzitic and sandstones from 800 feet to 1,500 feet high.

Competent geologists who have studied the country all agree that the whole district has been gradually elevated from sea level and the abundance of marine fossils in the limestone supports that hypothesis. This gradual elevation from the seabed in a warm

climate would be favourable to the deposition of nitretes, chlorides and other salts of sodium and potassium. But as they are soluble, especially in warm fresh water, the bulk of the deposits would be soon washed away and lost in the numerous rivers flowing from further north towards the low lying basin of Lake Eyre some 400 miles S.S.W. unless protected by a capping of rainproof rocks deposited shortly after they were laid down and the dry air on an almost rain less climate, Looking at the flat cap of maganiferous ironstone which crowns this deposit, it is obvious that is how it has survived.

It is on the extreme western fringe of the cattle country and as the tract of practically unknown country 200 miles thence to the Westralian border is similar geologically and climatically there might very well be other deposits scattered about in this large area of some one went out an looked for them. That was how the Nitrate of Soda deposits in Chilli were developed some 60 years ago, in a rainless tract on the slopes of secondary hills between the Andes Mountains and the Pacific coastline. This occurrence which has been found is not likely to be unique and the whole area stretching W. and to the North of what is satirically called Lake Amadeus on the maps should be worth looking over now that good rain has fallen after 5 years drought and the winter is approaching.

THE MINING of the Nitrate rock as exposed beneath the iron cap would be neither difficult nor costly as the deposit will be practically flat and the rock much softer than metalliferous ore but it will probably take about 5 tons of rock to produce 1 ton of crude salts going 90% to 95% $KN0_3$.

THE PLANT for leaching the rock and drying the salt out of the brine solution would doubtless be on the line of that used in producing Chile salt petre ($NaN0_3$) in South America where the process and treatment plants have in recent years been greatly improved in cost and efficiency.

PRODUCTTION COST. Assuming it takes 5 tons crude rock to make 1 ton dried salt going 90% to 95% $KN0_3$) and that the mine is worked at the rate of 20 tons per day this would give an output of 1,200 tons crude salt p. an. On the date so far available, it looks as if it could be landed at Port Augusta for about £16.9.4 per ton as shown in detail on estimate herewith. Item 2 of this estimate is somewhat conjectural but as regards item 4 on the writer's experience of haulage on a large scale over a similar bush track in North Queensland, it should be possible with regular running to get through on considerably less that 1/- per ton mile. Item 5 could also probably be reduced if the Commonwealth Railways Department were approached diplomatically. Items 6 and 7 are questions of organization and accountancy.

Careful enquiry from the best informed and authoritative sources shown that in 1927 the Commonwealth imported roughly 700 tons 95% $KN0_3$ (probably for the manufacture of blasting powder) and the cost landed in Melbourne was £25 per ton.

This shows a comfortable margin for profit and at the estimated cost of production there should be room for an extended production for use in the compounding of mixed fertilisers seeing that it contains both Nitrogen and Potassium in soluble form.

CAPITAL OUTLAY. A rough shot has been made to get the capital expenditure necessary to reach a mining output of 20 tons rock per day and treatment of same on the ground by leaching t produce 1,200 tons of crude salt p. an. Delivered at Alice Springs, including £2,000 for preliminary development and £1,000 for a bore to ensure constant water supply.
On the experience of the contractors for the recently completed railway to Alice Springs, this latter item would be ample provision apart from the probability that the Commonwealth Government would put this down themselves in accordance with the policy they are now carrying out of endeavouring to safeguard the cattle industry of Central Australia in that way. Items to cover cost of Leaching Plant with the necessary buildings, etc. are also included together with £500 for fixing u some of the worst portions of the track and the purchase of 2 Thornycroft 5 ton six-wheeled lorries.

PRESENT LEASE HOLDERS. A small company to develop the lease was formed in Adelaide some time ago with Me. E. Alchurch (Postmaster at Alice Springs) and Simon Reiff (prospector) as local directors. The immediate object of the company was to raise £1,000 to develop the limits of the deposit. But the project met with poor support in Adelaide, partly because an alleged gold mine further up the telegraph line (near Tennants Creek) had badly miscarried and partly because no one in Adelaide knew anything about Nitrates and their growing importance to the world. The Secretary of the company informed the writer under date of 9th instant that his Board were prepared to grant the writer a free option for a reasonable term and in the event of the option being exercised payment in fully paid shares for the lease in any company formed to provide capital for bringing the venture to the stage of actual production.
The actual percentage of the total shares of the company which they would be prepared to accept has not yet been decided but the writer has reason to believe that they would accept from 15% to 20% of the issued share register.

Although it seems probable that other similar deposits are yet to be found in the neighbourhood the prospecting of this lease first would obviously be the best policy and in view of its possible importance the expenditure o £1,000 should be worth the venture.
As, after 5 years of drought, good rains have recently fallen in this area and the cool fine winter weather is approaching the next few months would be a most favourable opportunity to make the test.

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