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DEPARTMENT OF SUPPLY AND SHIPPING.

MINERAL RESOURCES SURVEY.

REPORT No. 1944/35.

(Plan No.1145)

SECOND REPORT ON BERYL DEPOSITS NEAR YINNIETHARRA, WESTERN AUSTRALIA.

by

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GEOLOGIST.

9th October, 1944.

CANBERRA.

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DEPARTMENT OF SUPPLY & SHIPPING

MINERAL RESOURCES SURVEY BRANCH.

SECOND REPORT ON BERYL DEPOSITS NEAR YINNIETHARRA, WESTERN AUSTRALIA.

(Report No.1944/35, Plan No. 1166.)

by

N.F. Green, Geologist.

CANBERRA.
29/10/44.

DEPARTMENT OF SUPPLY & SHIPPING.

MINERAL RESOURCES SURVEY BRANCH.

SECOND REPORT ON BERYL DEPOSITS NEAR YARRIMATHARRA, WESTERN AUSTRALIA.

Report No.1944/35. Plan No. 1145.

1. INTRODUCTION.

A brief report on the occurrence of beryl on Yarrimatharra Station, Eastern Australia was prepared following a visit to the locality in December 1942 (Comm. N.D., Mineral Resources Survey Report 1943/3, Canberra, Jan.1943).

That report referred to three deposits -

1. ½ to ¾ mile N.25°W. from the Cairn.
2. ⅔ mile S.60°E from the Mica King mine.
3. Rocco's mine, 2 miles southeast from Derriney Hill.

The report stated that 20 or 30 tons of detrital beryl in large pieces could be picked from the surface with ease. It was pointed out that by collecting small pieces and sifting much the immediately available tonnage might be doubled.

In June 1944, the first two of the above deposits were again visited, as was also one on Bidgemia Station not seen on the previous occasion.

II. DESCRIPTION OF LOCAL GEOLOGY AND THE DEPOSITS.

A. Geology. The area is occupied by Pre-Cambrian (Archaean) rocks comprising gneissic granite, porphyritic and schist. The regional strike ranges from northeast to east-northeast with local deviations. The country rock has been invaded by numerous pegmatite dykes which have been injected into the sets of fissures striking concordantly with the schistosity and approximately at right angles to it respectively. These dykes range in size from almost insignificant veins to rock masses exceeding 100 feet in width and 600 feet in length. The pegmatite consists essentially of quartz, microcline and albite, and muscovite. Less commonly tourmaline may form a significant proportion of the dyke rock. Rare minerals that have been identified in the dykes are muscovite, lithiatite and bismuthinite, beryl and columbite. One prospector stated that he had discovered cassiterite in the area.

B. The Beryl Deposits. The three deposits described are shown on the accompanying locality plan which shows their relation to Yarrimatharra homestead, the Commonwealth mica mine and the Yaccoyna River. The locality is about 100 miles east from Carnarvon. No detailed surveys of the outcrops were made and consequently plans of the deposits are not available.

1. The Cairn. (Formerly Lease 1761). This deposit lies about 30 chains northeast from the Cairn but is known locally as the Cairn mica lease on which a cairn is erected.

The deposit is a pegmatite dyke of large proportions and containing a massive quartz core forming the ridge of a hill which rises 60 to 80 feet above the plain level. The slopes of the hill are covered with soil which supports stunted trees and scrub. No boundaries to the pegmatite were seen but in a few places pegmatitic rock was observed flanking the quartz. It is improbable that the quartz outcrops

the Cairn beryl lease in contradistinction to

represent one continuous body several hundred feet long, but rather a number of lenticular masses irregularly dispersed in a very large body of pegmatite. The general strike of the system appears to be between northeast and east and the dip steeply to the northwest or north.

The dyke contains a little scattered muscovite and one large aggregate of spotted mica occurs near the crest of the hill on the south side of, and adjoining, the quartz.

Beryl has been found lying on the north slope of the hill towards the eastern end. This detrital beryl which has now been removed was not uniformly scattered but occurred in an arrangement roughly approximating to lines normal to the contours of the northern and eastern slopes of the hill. This condition indicates that each patch of eluvial beryl was derived from a single crystal or an aggregate of crystals and that the occurrence of beryl in the dyke is irregular and bears a close analogy to the occurrence of other late minerals in pegmatite, such as the large crystals of muscovite.

Since the removal of all beryl from the surface, shallow diggings, from a few inches to about two feet deep recovered some beryl loosely embedded in the soil. The patch worked was small, probably not more than 200 square feet and it is reported that most of the material excavated was beryl. The excavation did not expose bedrock and several large pieces of beryl were showing in the bottom of the pit.

The holders of the lease propose to start mining the pegmatite for beryl shortly.

2. Near the King Alice Mine. The outcrop of this pegmatite is lenticular in plan and about 600 feet long on a bearing N.60°W. by a maximum of 90 feet wide. It is richly feldspathic and consists almost wholly of microcline and albite with quartz developed at the northwest end.

The outcrop forms a low hill on the southern bank of Norrincoy Creek (which skirts the southeast side of the dyke) and forms a steep face rising nearly vertically from the creek bed to a height of about 20 feet.

In December 1942 detrital beryl lying on and near the outcrop was estimated at 5 tons and prospectors subsequently collected this amount from this site.

/the Beryl in situ occurs in both/quartzose and feldspathic portions of the outcrop and shows some concentration towards the northeastern side at the southeastern end, where the mineral was estimated to form 5 per cent of the rock over a small area.

The pegmatite also contains tourmaline and small crystals of muscovite.

3. Bidgemia. A narrow beryl-bearing pegmatite occurs near the northern boundary of Bidgemia Station about 6 miles northeast from the Commonwealth Alice mine and 9 miles north from Dinner Table Hill.

The outcrop is on relatively flat ground but owing to surrounding hills access is by a circuitous and rough route.

The dyke strikes about N.30°W. and is between 300 and 600 feet long. Each end of the outcrop is occupied by a mass of quartz about 20 feet wide and the centre is constricted to 12 feet in width and consists mainly of microcline and spotted muscovite. Adjacent to the northeastern end of the southeastern quartz body a segregation of small crystals of muscovite measuring 6 feet by 4 feet occurs.

The quartz is rather milky but translucent and has a coarse granular texture which causes it to disintegrate by weathering into

angular fragments measuring about ¼ to ¾ inch in diameter. This uniformly sized gravel surrounding the outcrop is a distinctive feature.

Fragments of beryl were found scattered amongst the talus covering a gently slope beyond the southeastern end of the outcrop but no beryl was found in situ. The larger pieces had been gathered prior to the visit and this fact may account for the almost complete absence of beryl near the centre and northwestern end.

Columbite is widely though sparsely distributed in the dyke, apparently confined to the quartz, and several fragments of the mineral were picked up on the slopes to the south and southeast.

One ton of beryl had been gathered from this deposit and about a ton remained widely scattered on the surface.

C. Production of eluvial beryl. Since the visit in December 1942, prospectors have gathered the loose beryl lying on the surface and only small scattered fragments were seen in places where crystals up to 18 inches in diameter had been lying formerly.

By the end of February 1944 the great bulk of the surface beryl had been collected and totalled 72 short tons. Since that date further small quantities from less easily accessible deposits have been picked up and a start has been made to recover beryl buried in soil and detritus adjacent to pegmatite outcrops.

The total despatched from the field to the end of September 1944 is -

During 1943	45.5	Short Tons
During 1944 to end of September.	28.55	" "
	74.05	Short Tons.

In addition to this figure it is estimated that at 30/9/44 not more than 25 short tons of beryl may be at Yinnietharra awaiting transport or in transit from there to Perth.

III. BERYL AT THE COMMONWEALTH MICA MINE.

The Commonwealth Mica Mine is situated ¾ mile west from the Cairn beryl deposit on the eastern slope of a low rise.

The principal workings consist of an open-cut to a depth of 44 feet, and two smaller and shallower open-cuts developed in the same pegmatite dyke.

Before the surface was disturbed crystals of beryl up to 6 inches diameter were seen amongst the quartz talus and debris surrounding the outcrop. Most of the beryl was lying in the area now occupied by the main open-cut. The quantity of eluvial beryl seen was not great and much less than that seen at the three sites mentioned in the introduction to this report.

During mining operations pieces of beryl were picked out of the rock and set aside.

It is probable that this hand picking was not performed very efficiently for the following reasons -

(1) Whole crystals of beryl freshly broken from the pegmatite often are coated with flakes of muscovite or are stained and then resemble microcline and are liable to be overlooked.
(2) Broken fragments of beryl resemble quartz and may be overlooked for this reason.
(3) The mineral is very brittle and liable to shatter during mining.
(4) The mine operated under artificial light for part of the time worked.

Even under the best of conditions only large pieces, that is nothing less than about a 2 inch cube, would be picked out and set aside.

From the mining of 5000 long tons of pegmatite, the amount of beryl recovered was only 600 lb. and by June 1944 the approximate figures were 800 lb. of beryl from 6000 long tons of dyke rock. If special precautions were taken to recover all the beryl that it was practicable to collect it is doubtful whether this figure could have been more than doubled. Serious loss on account of the brittleness of the mineral would always be an important factor. At the mica mine beryl occurs as a late mineral in the replacement zones of the dyke. It occurs sporadically as single crystals and replaces quartz, felspar and muscovite. It is generally associated with the large masses of quartz, occurring near their boundaries, and is sometimes found amongst aggregates of large microcline crystals.

IV. PROSPECTS FOR SUCCESSFUL MINING OF BERYL.

With the approaching exhaustion of supplies of eluvial beryl, mining of the beryl-bearing dyke at The Cairn has been proposed.

The results achieved at the Commonwealth mica mine are not without significance and although the beryl content of that pegmatite was not expected to be high, the mode of occurrence there revealed will hold good for other dykes in the locality.

Only segregations of beryl analogous to the mica pockets could be mined with any hope of profit and there is little evidence that such segregations exist. The sporadic occurrence of beryl crystals or zones enriched in beryl would render mining an extremely speculative proposition as the rock broken would require to contain at least 10 per cent of recoverable beryl at present prices.

V. CONCLUSIONS.

Operations during the past 18 months have virtually exhausted eluvial deposits of beryl although further quantities still exist buried in soil and talus on slopes flanking outcrops of beryl-bearing pegmatites. It is also possible that some small yield of beryl will be found further afield on Bidgemia and Mt. Phillips Stations, and other outlying parts of Yinniothurra.

Future production on this field is likely to be small even if the demand is maintained and it is now known that the requirements of the United States will cease at the end of this year. It is possible, however, that local consumption of beryl will increase greatly in the near future.

Mining of pegmatite for the recovery of beryl, unless valuable by-products are also produced, is not likely to be successful under present conditions.

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