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OCCURRENCE OF HEAVY MINERAL BEACH SANDS IN THE VICINITY OF POINT BLAZE, NORTHERN TERRITORY

by

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SUMMARY.

An occurrence of heavy mineral beach sands, reported to occur in the vicinity of Point Blaze, Northern Territory, was briefly examined. The boundaries of the deposit were defined by shallow scout boring, and samples from bores put down across the deposit indicated approximately 4,000 tons of heavy mineral between the foredune and the seaward limit of the deposit. It was calculated that this heavy mineral contains approximately 200 tons of rutile and 700 tons of zircon. Additional tonnages of rutile and zircon under the foredune are inferred to be of the same order.

INTRODUCTION

In August, 1957, Mr.G. Haritos of Darwin collected a sample of heavy mineral sand from the surface of a beach in the vicinity of Point Blaze, Northern Territory. Laboratory tests showed that the sample contained an appreciable percentage of zircon and rutile. Mr.Haritos reported that the black sand occurred extensively on the surface of the beach, but he did not know how deep the heavy mineral persisted.

Early in September, 1957, the writer accompanied Mr. Haritos to the Point Blaze area on board the launch M.V.D.3 to examine the area briefly and to assess the economic possibilities of the reported deposit as a source of rutile.

LOCALITY AND ACCESS

Point Blaze forms a headland on the south-west of the Northern Territory coast at latitude $12^{\circ}55'S$ longitude $130^{\circ}10'E$. The beach investigated is arcuate and extends for $2\frac{1}{2}$ miles from Point Blaze in the south-west to Fog Bay in the north-east. The area is covered by aerial photographs Fog Bay Runs 4A/5019 and 5/5019.

Access to the locality is by sea; it is 70 nautical miles south-west of Darwin. Access to the beach is made difficult by shoals and reefs close inshore. Although the launch has a draught of only 4 feet 6 inches, it was necessary to anchor $1\frac{1}{2}$ miles out from the beach and to go ashore, across the bar and through the surf, in a dinghy.

GENERAL GEOLOGY

Noakes (1949) has provisionally mapped the sediments of this area as part of the Port Keats Group. The group consists of shale, sandy shale, calcareous shale, and sandstone. The only outcrops seen by the writer in the vicinity of the beach area consist of laterite. The laterite fringes the beach behind the foredune, underlies the beach, and extends below the water line.

The beach itself is 150 feet wide at normal high tide. It is bounded on the landward side by a long, continuous foredune which is about 20 feet high and which is 30 feet wide on the average. Away from the beach the foredune drops abruptly to a low, flat, sandy area which is part of the western plains. This area carries coarse grasses and stunted vegetation and probably forms shallow swamp land during the wet season.

HEAVY MINERAL SAND DEPOSIT

GENERAL:

Scout boring indicates that the heavy mineral deposit occupies roughly the mid-section of the beach, and extends for 3,500 feet along the beach, and from beneath the foredune seawards for about 30 feet from the base of the dune. The deposit extends below the foredune, but samples taken from the base of the dune on the landward side show only a trace of heavy mineral. Except under the foredune, in no part of the deposit is the mineralized sand covered by more than an inch or two of quartz sand and shell fragments. The vertical extent of the deposit is limited by the underlying laterite to a maximum depth of 2 feet 6 inches. The grade of the deposit seems very uniform along the length of the beach.

BORING AND SAMPLING:

Boring was by means of a post-hole digger four inches in diameter. Holes were sunk until they encountered laterite, usually from one to two feet below the surface of the beach. The boring equipment was not suitable for testing the high foredune. Short channels dug into the seaward face of the dune, showed that the heavy-mineral deposit continued beneath the dune; but samples taken from the landward side of the dune produced only traces of heavy mineral. Several bores were put down in the low, flat area behind the foredune. The samples obtained from these bores were dark owing to humus material, but contained no heavy mineral.

When the limits of the deposit had been defined by scout boring, a test line was marked out approximately midway along the deposit and at right angles to the length of the beach. Holes were bored along the line at intervals of 10 feet down to the level of laterite. Boring along the line was terminated when samples from a bore showed only a trace of heavy mineral.

The sand recovered from each bore in the test line was mixed to form a single sample which was quartered down to approximately 1,000 c.c's. and bagged.

LABORATORY WORK:

Laboratory work was carried out in the Canberra laboratory.

Each sample was weighed and the heavy mineral in the sample was concentrated by gravity methods. The sample was partly concentrated on a Haltane Superpanner and the heavy mineral concentrate was finally cleaned by heavy liquid separation; acetylene tetra-bromide - S.G. 2.95 - was the heavy liquid used for this purpose. The heavy mineral concentrate was weighed and the weight percent of heavy mineral in the sample was calculated.

The heavy-mineral concentrates were weighted in proportion to the quantity of heavy mineral intersected in the respective bore holes; the weighted concentrates were mixed to form a composite sample hereafter referred to as the Composite. The percentage composition of the Composite was determined in the following manner: -

A highly magnetic fraction of magnetite- Fraction A - was first removed from the Composite with a strong hand magnet. The balance of the Composite was then separated electro-magnetically on a Frantz Isodynamic Separator. This yielded a moderately magnetic fraction - Fraction B - of hematite and a small percentage of zircon; ✱ a weakly fraction - Fraction C - composed of tourmaline and hematite; and a non-magnetic fraction - Fraction D - made up of zircon and rutile. Fraction D was separated into its component minerals with a laboratory-type electro-static separator. The fractions were weighed and grain-counted, and the percentage composition of the Composite was calculated.

Table 1 gives percentage weight of heavy mineral in bore samples and percentage conposition of the Composite.

RESERVES OF HEAVY MINERAL:

It is calculated that the heavy mineral deposit on the seaward side of the foredune extends for 3,500 feet along the beach, has an average width of 30 feet and an average thickness of 1.5 feet. If we assume that 3 percent by weight of heavy mineral is equivalent to 80 lbs. of heavy mineral per cubic yard of sand, the average grade of the deposit is given as approximately 1,600 lbs. of heavy mineral per cubic yard of sand, and the tonnage of heavy mineral in the deposit is approximately 4,200 tons. These figures are summarized in Table 2.

It is inferred that a similar tonnage of heavy mineral exists beneath the foredune. In this case, however, the mineral sand is covered by some 20 feet of overburden.

CONCLUSIONS.

1. The heavy mineral deposit on the seaward side of the foredune is ephemeral. The writer suggests that the deposit was formed on the upper part of the beach by the strong wave and surf action of last seasons stormy weather. The thin covering of quartz sand and shell fragments was probably provided by subsequent wind action. It can be expected that the rough seas of the coming wet season will sweep away the heavy mineral and re-deposit it elsewhere.

2. The heavy mineral deposit is of no economic importance at present because of -
   (a) the remoteness and inaccessibility of the deposit;
   (b) the small tonnage of rutile contained in the deposit.

✱ Zircon grains in Fraction B contained many opaque inclusions.

(Reference) NOAKES, L.C., 1949 - A Geological Reconnaissance of the Katherine-Darwin Region, Northern Territory etc. Bur.Min.Res.Geol. and Geophys.Bull.No.16.

TABLE 1. POINT BLAZE AREA

Percentage weight of heavy mineral in bore samples and percentage composition of the Composite.

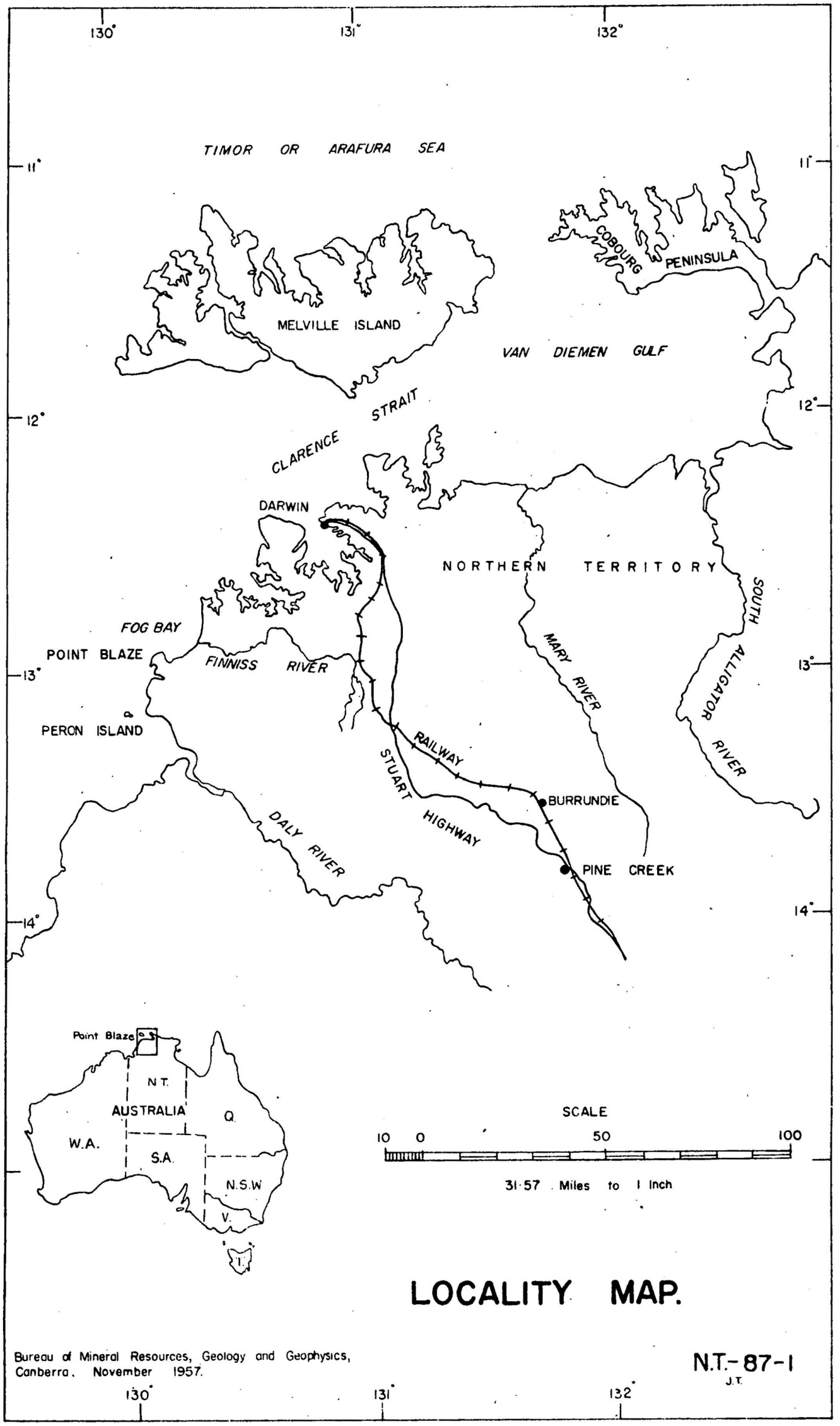
Bore No.	Depth of Bore from Surface of Beach.	Distance of Bore from Base of Dune.	Wt% of heavy mineral in sample from Bore.	Percentage Composition of the Composite.				
				Magnetite	Hematite	Zircon	Rutile	+ O Minerals.
1	0 - 2 feet	00' (base dune)	75.6					
2	0 - 1 ft.6 ins.	10'	85.5					
3	0 - 1 foot	20'	48.2	41.3	37.5	16.2	4.0	1.0
4	0 - 1 ft.3 ins.	30'	3.1					
5	0 - 2 ft.6 ins.	40'	0.2					

+ O. Minerals consist predominantly of tourmaline with minor amounts of green spinel, corundum and staurolite.

TABLE 2. POINT BLAZE AREA

Reserves of Heavy Mineral on Seaward side of Foredune.

DIMENSIONS OF DEPOSIT			TOTAL MINERAL			TONNAGES OF ZIRCON & RUTILE	
Length	Average Width	Average Thickness	Vol.	Grade	Weight	Zircon	Rutile
3,500 feet.	30 feet	1.5 feet	5,800 c.yards	1,600 lbs. c. Yard.	4,200 tons	680	170



LOCALITY MAP.

Bureau of Mineral Resources, Geology and Geophysics,
Canberra. November 1957.

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J.T.