

TR 10-40-41

7. MAGNETOMETER SURVEY, NARACOOPA, KING ISLAND

by D. I. Groves

A magnetometer survey was carried out over beach sands in the Naracoopa area, King Island between the 4th and 8th October, 1965, at the request of Mt Costigan Mines Ltd. A Jalander Model 1957 magnetometer was used for the survey. The instrument is fully portable and does not require accurate levelling, but still retains an accuracy of ± 10 gammas on the lowest scale. Hence it was entirely suitable for the rapid traversing over an extensive area which was required for this survey. The magnetic prospecting was undertaken in an area covered by Exploration Licence 10/65, in a rectangular area bounded by the Fraser River to the south and west, Eldorado Creek to the north and the coastline of Sea Elephant Bay to the east.

The area investigated comprises three geomorphological units composed essentially of sand: (a) the present beach level, (b) a raised level some 50 to 100 feet in width about 5 feet above high water level, and (c) an extensive level which extends back to the Fraser River at a height of some 50 feet above high water level. The present beach is composed essentially of white sand with accumulations of heavy minerals in places. The sand of the lower raised level comprises a high percentage of heavy minerals including ilmenite, rutile, zircon, monazite and cassiterite while the higher level is composed essentially of quartz sand with about 5% heavy minerals, although richer accumulations of heavy minerals occur in places.

The consistent occurrence of a high ilmenite content in the heavy mineral concentrations was used as a basis for magnetic prospecting. It was expected that magnetic anomalies would be apparent over known ilmenite-bearing sands, and that magnetic prospecting could be used as a tool in the location of further ilmenite-bearing sands which would also contain rutile and cassiterite.

The survey was carried out along a series of parallel traverses extending perpendicularly from the coastline of Sea Elephant Bay to the Fraser River. The traverses were set 100 feet apart and marked in 100 feet lengths, readings being taken at 50 feet intervals. No anomalies were obtained during the entire survey, the magnetic field over areas of known ilmenite concentration showing no measurable deviation from that over quartz sands.

The results of the survey indicate that the magnetic field was not intensified over areas of ilmenite-rich sand, although ilmenite generally has a higher magnetic susceptibility than the other minerals in the sand. A high titanium content can cause diminishing magnetic susceptibility of the ilmenite, but this is not applicable in this case where the titanium is not abnormally high.

It is probable that each ilmenite grain would retain a remnant magnetism from the original source rock if the rate of mechanical action has been greater than that of chemical weathering during the erosional history of the grains. In this situation each grain would have its own remnant magnetic field, which would statistically bear no relation in direction to the fields of neighbouring grains as they are roughly equidimensional. Thus the resultant magnetic field of a large number of ilmenite grains will tend to become zero. This phenomenon adequately explains the lack of higher magnetic fields over ilmenite concentrations at Sea Elephant Bay, and probably severely limits the application of magnetic prospecting to beach sand deposits generally.