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A REPORT ON GRAVITY SURVEY
OVER THE MOULTING LAGOON REGION
NORTH EAST TASMANIA
ON BEHALF OF 25/78
MEEKATHARRA MINERALS N.L.

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A REPORT ON
GRAVITY SURVEY OVER THE MOULTING LAGOON REGION
NORTH EAST TASMANIA
ON BEHALF OF
MEEKATHARRA MINERALS N.L.

BY

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GEOPHYSICIST

SYDNEY, N.S.W.

MAY, 1980

TAS-077

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SCINTREX PTY. LTD.

GEOPHYSICAL CONSULTANTS AND CONTRACTORS

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SUMMARY

A reconnaissance gravity survey was executed over the Moulting Lagoon area. The survey more adequately defines a previously discovered gravity low which corresponds to a probable sedimentary trough. Gravity highs in the area are found to correspond to areas of dolerite outcrop.

A REPORT ON
GRAVITY SURVEY OVER THE MOULTING LAGOON REGION
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MEEKATHARRA MINERALS N.L.

INTRODUCTION

At the request of Mr. D. O'Callaghan, Managing Director of Meekatharra Minerals N.L., Scintrex Pty. Ltd., executed a gravity survey over the Moulting Lagoon area north-east of Swansea, Tasmania.

The work was carried out over three and a half production days between 4th and 8th March, 1980, under the direction of Scintrex geophysicist G. Street, M.Sc, DIC., assisted by geophysicist G. Blackburn, B.Sc. (Hons) and R. Prydon.

The object of the survey was to locate stratigraphic traps with possible oil accumulations.

The area to be surveyed was covered in some detail by a previous survey by the Tasmanian Mines Dept. This survey covering the Eastern Highlands, conducted by D.E. Leaman during the past seven years, has covered much of the area of interest between Bichno and Swansea. Examination of this work revealed a number of areas of possible interest. The area close to Moulting Lagoon was in particular considered to be of most significance. This area was not covered in great detail by the Mines Department survey due to poor access to the swampy areas close to the water.

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The Scintrex survey covered a total of 45 stations placed interstitially to the previous survey and tied in at a base station near the "Belmont" property. The stations were sited so as to better define the large gravity low which occurs to the south-east of Moulting Lagoon and to see whether it has any continuation across the lagoon towards the north-west. In addition, the gravity high sited between two lows on the west side of the lagoon was considered to be of some interest.

SURVEY DETAILS AND ACCURACY

Gravity readings were taken using a Worden extended range type gravity meter number 273. Heights were measured over the area using two Askania micro-barometers. However the high pressure and temperature variations over a day occurring in these near coastal conditions made the barometers unstable. Heights were then calculated from topographic maps. As the majority of the readings are around the lagoon close to high water level, the heights are considered to be accurate to better than one metre.

The base station used for the survey was the gravity tie station 7551-9409 at the entrance gate to "Belmont" north of Swansea. All points were tied in to this base using also a number of sub-base stations closer to the lagoon. The stations were read in loops and tied in to either base station or sub-base every two hours to measure any drift. Data is considered to be accurate to better than 1 milligal.

Bouguer free-air and latitude corrections have been made on all the data obtained using a density of 2.67. Regional and terrain effects have not been removed.

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RESULTS

The results are presented as a contour plan in which the observed values have been tied into the Mines Department survey. It is understood that the client has access to the Mines Department data.

The most significant feature of the area is a 26 milligal high south-west of Moulting Lagoon. This area was examined in some detail as it represents a boundary between the two troughs indicated by gravity lows to the east and west. The region of the anomaly is a hill capped with dolerite. The significant gravity high at this point is interpreted as being due to a feeder pipe from which the dolerite was extruded. By simple calculation the gravity high cannot be accounted for by the extra mass of dolerite constituting the hill. The high density dolerite must extend to some depth to produce this anomaly.

A number of other gravity highs up to 14 milligals occur to the north of this anomaly and on the north side of Moulting Lagoon. Each of these corresponds to an area of dolerite outcrop. To the south on the sandbar a 12 milligal high is interpreted as due to similar circumstances. The dolerite in each of these cases is believed to be surface flows only.

Measurements taken on the north and west side of the lagoon show the significant gravity low on the east side of the sandbar shown in the Mines Department survey, does not extend across the lagoon. It is also obvious that there is no significant correlation between the eastern and western trough and that they are well separated by the dolerite.

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The most interesting target for oil exploration remains the strong gravity low recorded by the Mines Department survey across the mouth of the Swan River. An examination of this low is done from the Mines Department contour plan. A line profile is drawn along the sandbar at a latitude of approximately $42^{\circ}05'30''S$. This profile shows two distinct troughs corresponding to the river valleys of the Swan and Apsley. Separating these two is a region of higher gravity, this is interpreted as being due mostly to the influence of the hill of dolerite and the dolerite feeder to the north plus possible further flows under the sandbar.

The larger of the two lows can be approximated by a trough of sediment having a density difference of negative 0.5 grams per cubic centimetre relative to surrounding rocks and a depth of approximately 800 metres.

This density contrast is calculated on giving the trough material a density of around 2.2 grams per cubic centimetre, which represents the upper limit for alluvium and within the range for less dense sandstones and shales.

The trough being quite recent will contain a fair proportion of poorly consolidated material and therefore this depth estimate should be regarded as a maximum. A lower limit with a density contrast of .95 gives a thickness of 300 metres to the trough.

It is believed that the true depth of the sediment pile lies somewhere between these two estimates.

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CONCLUSIONS AND RECOMMENDATIONS

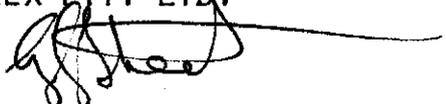
As a result of this gravity survey, no evidence was found of possible stratigraphic traps for oil accumulations. All gravity highs located, appear to be related solely to remnants of dolerite volcanism.

The major gravity low south of moulting lagoon appears to be related to a trough of sediment 300 to 800 metres thick, depending on the amount of consolidation. To the south the trough appears to deepen and link with another sediment pile from the west. This is also related to the deltaic sedimentation of the Swan and Apsley Rivers. In the north these two troughs are separated by a dolerite pile including a probable feeder pipe.

As the trough appears to deepen to the south, the area of interest for future work would be in Great Oyster Bay itself. The thickness of sediment in the Moulting Lagoon area and its probable recent age does not suggest a good source for oil accumulations. However, if there is a thicker pile of sediment to the south, further interest would be warranted. Possible follow methods would include an off shore magnetic survey to get an estimate of depth to basement in the bay. Reflection seismic methods both on shore on the sand-bar and off shore in Great Oyster Bay would provide more diagnostic information.

Respectfully submitted on behalf of:

SCINTREX PTY. LTD.


G.J. STREET, MSc, DIC.

GEOPHYSICIST

Refer
best soundings in
Keenan & Richards
grav. Survey of E. of Island.

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mgals

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Profile of -
 BOUGUER GRAVITY ANOMALY
 along latitude 42° 05' 30" S

MOULTING LAGOON AREA
 Source - Mines Dept.
 Report 1978/39
 Fig. 6

Job No. TAS-077

WEST DOLERITE TERTIARY SANDS, CLAYS AND RECENT ALLUVIUM ELVER MOUTH GRANITE GOOSE EAST

1 km

5 cm

