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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

# BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

**RECORDS**

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## GRAVITY SURVEY OF NORTHERN AREA OF LEITH CREEK, SOUTH AUSTRALIA

By

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Plan No G 17/3 file with the Summons



DEPARTMENT OF SUPPLY & DEVELOPMENT

PROGRESS REPORT

# GRAVITY SURVEY OF NORTHERN AREA OF LEIGH CREEK, S.A.

REPORT NO. 1948/48 - GEOPHYSICAL SERIES NO. 7.

The first phase of a gravity survey of Cretaceous covered areas to the north of the brown coal deposits at Leigh Creek, S.A. was carried out between October and December, 1947. The results were covered by a report by C.H. Zelman who recommended that a gravity low to the west of Lyndhurst should be tested by drilling. This "low" was similar in character to the gravity low obtained over the Telford Coal basin and it was tentatively assumed that it was due to another basin. However, a similar low had been mapped in the extreme north east corner of the area where the precambrian sediments were known to outcrop and this low was evidently due to the presence of low density precambrian rocks.

The drill was put down as recommended and penetrated extremely weathered precambrian shales at a depth of 115 feet. Although the material from surface to this depth was unconsolidated and low in density, the thickness was not sufficient to account for the observed decrease in gravity. It is certain that this unconsolidated material contributes in part to the low gravity values but at least 3/4 of the reduction must have been due to presence of precambrian rocks of density considerably below average.

The gravity survey was resumed in May 1948, after some preliminary survey work had been carried out by the South Australian Department of Mines.

Since the gravity survey was resumed an area of approximately 20 square miles, lying to the west of Leigh Creek and adjoining the area previously surveyed on its eastern side, has been covered by a network of stations at approximately half mile intervals. The contouring of the gravity values on this new area has revealed the presence of two separate anomalies in which gravity values are low. The centre of one of these lies approximately 4 miles west of Leigh Creek and it is bounded by co-ordinates 15 to 17 north, 9 to 12 west. The area of low gravity values is elongated in an east-west direction. Precambrian rocks striking approximately east-west outcrop over a small area about one mile northeast from the centre of this low. The coincidence on strike between these rocks and the long axis of the anomaly suggests that the anomaly may be due to low density precambrian rocks. However, it could be due to a basin in the precambrian rocks filled with lighter rocks such as Triassic coal measures. It is therefore recommended that a test hole be drilled in the centre of the low at the position shown on the accompanying plan near co-ordinates 10.7W/16N.

The second anomaly is also on the western side of Leigh Creek and approximates 4 mile south east of the one described above. This anomaly has a pronounced minimum which is elongated in the northwest-southwest direction. To the southwest of the anomaly and about 1 mile from its axis, precambrian rocks outcrop and their strike is similar to that of the anomaly. Testing of this anomaly by drilling is recommended and a site has been selected near its centre. This site is shown on the accompanying plan near co-ordinates 8W/13N.

It is stressed that the interpretation presented on the plan is tentative and may be revised. This revision would not however, greatly modify the shapes and positions of the gravity lows by may effect their absolute magnitudes.

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The results of the survey and testing to date have established that gravity lows can be expected from two independent causes, namely basins filled with relatively light sediments and precambrian rocks of abnormally low density. Drilling is the least expensive way of determining which of these causes is responsible for any individual low although it might be possible by refraction seismic methods to determine the thickness of Post Precambrian sediments.

Mapping of the structure of the precambrian rocks, where they outcrop near a gravity low may suggest a possible cause but this in no way eliminates the need for testing by drilling.

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