# ACKLEY BATHOLITH GRAVITY SURVEY

by

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## Introduction

Gravity data were collected in September, 1983 in association with the geological mapping of the Ackley pluton and surroundings described elsewhere in this volume (Tuach, 1984). The objective of the gravity mapping was to obtain gravity data for use in modelling the subsurface configuration of this pluton. The models obtained from the gravity data are to be used in studies on the metallogenic evolution of the area.

Fifty-two gravity stations were occupied along three traverses, two using helicopter access across the Ackley batholith and the Cross Hills plutons and the third along the existing road network to tie the other two profiles together. The station spacing was approximately 5 km along the two major profiles (Figure 1) and 1 km along the road profile. The preliminary interpretation of the data for the traverse across the Ackley Batholith is presented here.

The gravity data were collected using a Lacoste-Romberg land gravity meter. Elevations were obtained from barometric altimeters using survey methods appropriate to the local elevation control network (Miller and Deutsch, 1976). Positions were scaled from 1:50,000 topographic maps. The survey was tied to the Canadian national gravity network through the use of the national network base station at Terrenceville.

The Bouguer anomaly was calculated at each station using the appropriate base gravity value, the 1968 International Gravity Formula, and a crustal density of 2.67 g $cm^{-3}$. The anomalies calculated by this method are absolute Bouguer anomalies which can be compared with the previously published anomalies on the older anomaly maps produced by the Dominion Observatory (Weaver, 1968) by subtracting approximately 6.2 mGal from the older Weaver data. This adjustment is necessary since the anomalies on the older maps were computed using the 1931 International Gravity Formula and the old base network.

## Interpretation

Weaver's data were collected with a mean station spacing of 13.5 km. The Ackley Batholith is easily recognized on these maps (Weaver, 1967, 1968) as a region of gravity anomalies significantly lower than those of the surrounding area. The lowest anomalies occur over the central portion of the pluton with positive anomalies occurring to the northwest and southeast of the pluton.

The present survey was undertaken to provide a more detailed set of data along a profile perpendicular to the regional geological trend. These data were modelled to ascertain the thickness and the rock density distribution within the pluton. The results of the modelling are to be incorporated into the interpretation of the evolution of the mineral deposits found on the southeastern side of the pluton. The gravity analysis is to be accompanied by an interpretation of the aeromagnetic data for the area.

To date the gravity data have been reduced and a preliminary model of the gravity field has been obtained using rock densities typical of other Newfoundland granites, gneisses and volcanics. More detailed and precise interpretation will be possible when the densities and magnetic susceptibilities of samples from the area are analyzed.

The major conclusion from the study is the affirmation that the maximum thickness of the pluton is in its southeast corner. The maximum thickness calculated using the density chosen is 9 km (Figure 2). The calculated thickness is sensitive to the density used for the pluton. Should subsequent studies indicate that the density must be modified, the geometry of the body will remain the same but the absolute thickness will vary from that in the model. The analysis of the magnetic data will permit a more detailed analysis of zonation within the pluton.

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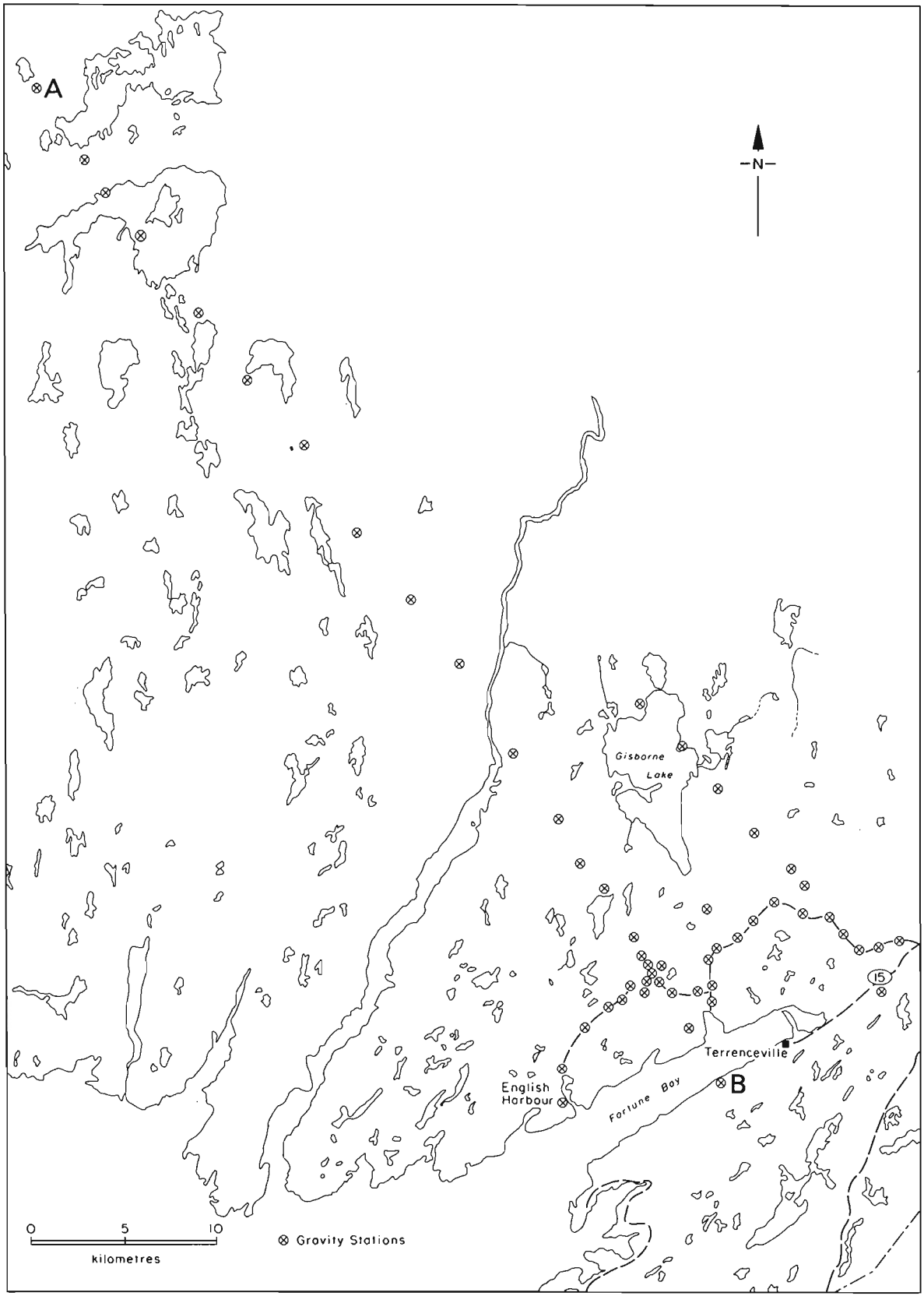


**Figure 1:** *Ackley gravity survey.*

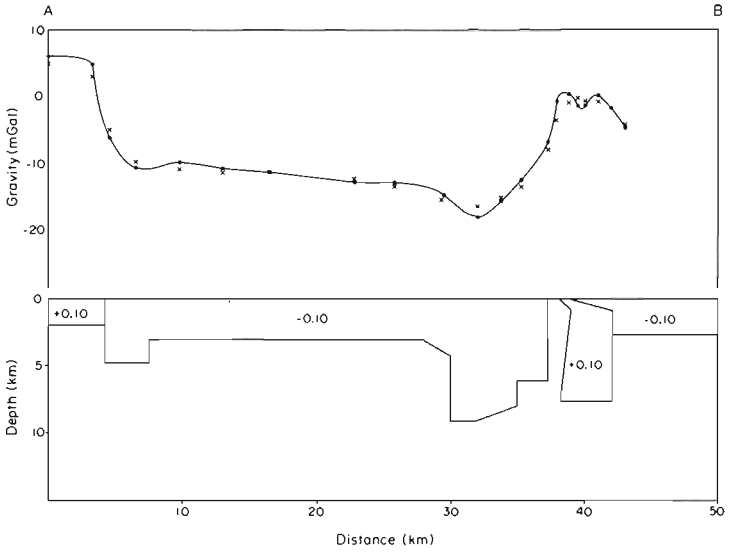


**Figure 2:** *Gravity profile.*

The determination of the subsurface configuration of the pluton from the combined gravity and magnetic analysis will present a model which will be combined with the metallogenic studies to explain the presence and evolution of the tin and molybdenum deposits associated with the pluton.

**References**

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